THE CONCEPTS OF "INDIVIDUAL" AND "SPECIES" IN CHEMISTRY

by

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1. Natural History (including zoology, botany and mineralogy), in order to fulfill its classificatory task, cannot dispense with the concepts of "individual" and "species". Consequently these notions were introduced into the science of inorganic nature, independently of any theory, from its earliest beginnings. Already in antiquity substances were divided into true compounds (mixtio vera) and mechanical mixtures, heterogeneous aggregates, which are only *one* to the senses (mixtio ad sensum[1]). Leaving aside the philosophical definitions of both categories, we will turn our attention to the oldest *practical* criterion of a chemical individual, viz. homogeneity. Each homogeneous phase is considered as a chemical individual and homogeneous phases with similar (if not always wholly identical) properties belong to one chemical species, just as similar individuals in botany and zoology are united in one species.

From the chemical point of view "composition" is one of the main characteristics of a substance. However, it is quite understandable that at first only a qualitative similarity of composition was asked for and that little attention was paid to equality of quantitative proportions.

The acceptance of Proust's law, which is inculcated in the mind of the chemist in his youth, has established the conviction that fixed ratios between the constituents of a chemical compound is the *normal* case, and thereby logical and historical insight into the species problem has often been distorted. This law could not occur as early on the pages of history as it appears on the pages of a textbook. In order to assert some chemical truth concerning bodies, we must have these bodies known by some tests not chemical. Next we might state whether they always exhibit

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constant proportions or not. Proust's law might provisorily be considered at best a *definition*: all substances possessing a definite composition are called "chemical compound", and to all other substances this name is denied. This becomes evident when Haüy says that chemical composition is not one of the many characteristics of a species, but, on the contrary, determines the species[2]. Every deviation from constant proportions might then be ascribed either to experimental errors or to impurities. Consequently, the criterion of definite composition either has to be posited a priori on theoretical grounds, or it is stated afterwards as one of the attributes of objects which for other reasons were already recognized as chemical compounds.

In accordance with Palissy's saying, "pratique a engendré théorique", the concepts of "chemical individual" and "chemical species" existed before their (definite *or* indefinite) composition was thought about and the main criterion was *homogeneity*. Homogeneous phases belonging to the same species were similar or almost similar; in some cases there was a definite composition, in other cases the individuals of the same species differed in this respect. But not only does the notion of "chemical compound of definite composition" come after the concept of species, it has also a different logical structure. In the course of the 19th century the empirical concept of "chemical species" has wrongly been identified with the theoretical notion of "chemical compound of definite composition", but when modern chemistry was still in its beginnings many chemists had clearer ideas upon the matter.

2. According to Newton the solution of salt in water implies that there is a repulsive force between the salt particles, or, at least, that they attract the water more strongly than they do one another (Opticks, 1704, query 31). The dissolution of salt in water as well as the dissolution of copper in nitric acid were considered as chemical phenomena and the majority of 18th century chemists held this opinion (e. g. G. E. Stahl 1720; Fourcroy 1801).

Boerhaave, one of the most influential writers of the 18th century, made the old distinction between mechanical mixtures and chemical compounds; only the latter are produced by chemical attractions. Of course he had other criterions than this theoretical characteristic for recognizing chemical compounds. According to him, a true compound possesses a permanent homogeneity; even in the long run there will be no sedimentation[3]. The solution of salt into water and of metal into acid

will then turn out to be chemical phenomena, whereas the suspension of clay in water is only a "mechanical dissolution"[4]. Moreover, Boerhaave finds that alteration of properties and a heat effect accompany chemical combination[5].

These homogeneous phases sometimes appeared to have a definite composition, sometimes an indefinite one. The first unequivocal instance of constant proportions was given by Angelo Sala's analysis of copper vitriol (1617, 1625), which contained the same percentage of water, independently of its origin[6]. It is most remarkable that Angelo Sala had to state this fact for a substance which in his eyes was *not* a true compound, but only an accidental one, without a proper "substantial Form"!

In the 18th century more and more "definite" compounds were recognized. Black's analysis of magnesia and chalk (1754), the experiments on neutralization of acids and alkalis by Wentzel (1777) and Richter (1793), Lavoisier's experiments on oxides and organic compounds, demonstrated that the constituents of these substances are combined according to fixed ratios. However, it would be wrong to conclude that in the sequel a definite composition was assigned to *every* chemical compound. Berthollet (1803) recognized that there are substances with "constant proportions", but they are "border cases"; Proust, on the other hand, did not deny that solutions have "indefinite proportions". But Berthollet held that "dissolution is a true combination"[7], although a weak one[8] whereby the characteristic properties of the dissolved substance in most cases do not wholly disappear[9]. Thus he remained faithful to the generally received tradition which held that the "affinity of combination" of the particles of the solid for those of the solvent is greater than the "affinity of aggregation" of these particles for each other (Baumé 1773; Wiegleb 1796; Klaproth 1806; Fourcroy 1801). Even J. B. Richter, who discovered so many "fixed proportions", regarded solution as a chemical phenomenon (1793). As instances of "solution" Berthollet mentioned, besides the case of a solid in a liquid[10], also those of a gas in a liquid[11], a liquid in a liquid[12], a gas in a gas[13], whereas alloys too were compared with solutions[14].

Besides homogeneity the heat effect and the non-additivity of properties (e. g. volume) provided the means for distinguishing a chemical from a mechanical process (Guyton 1786; Fourcroy 1801)[15]. The first criterion, however, was emphasized most and therefore even the diffusion of gases and the dissolution of gases in liquids were considered chemical phenomena (Berthollet, Karsten[16]). As in these cases only a very weak "force

of affinity" was considered to be engaged, the alteration of properties and the heat effect must be almost imperceptible[17]. However, the main characteristic of a chemical compound, viz. homogeneity, is clearly present.

On the other side, Dalton, in spite of the homogeneity of a gas mixture (which he in vain tried to disprove), rejected this chemical explanation of diffusion, because there is no change of volume, no alteration of characteristic properties and no heat effect[18]. Consequently, gas diffusion is a "physical" or "mechanical" phenomenon and Dalton assumed the task of explaining how it is possible that a mechanical mixture of bodies with different specific weights remains homogeneous. He tried to find different proportions between the components of air at different heights, but he failed[19]. He had more success with other experimental proofs of the physical character of diffusion. The vapour tension of a liquid appeared to be independent of the quantities of gases which were above it and it did not change even if there was no gas at all (1801): "the fact that the quantity of vapour is the same as in air ... is certainly the touchstone of the mechanical and chemical theories"[20].

From the fact that gases, when dissolved in water, act independently of each other, he concludes that a solution of a gas in a liquid is a mechanical mixture[21].

Thus, Dalton denied the unity of some homogeneous phases (gas mixtures) because at their formation certain phenomena are lacking; the very occurrence of these phenomena (heat effect, change of volume) strongly support the view that solutions of solids in liquids indeed are chemical individuals, which, if they have the same constituents, may be assembled in a certain species. The definite composition plays only a very subordinate role in these arguments.

In the 18th century it was discovered that the physical constants (density, melting point, boiling point) of solutions are dependent on the quantitative composition (and that they change during the processes of evaporation and crystallization), whereas liquids of definite composition (e. g. water) may be characterized by a definite density, boiling point, vapour tension, etc. Nevertheless, Gay-Lussac, who introduced the custom of mentioning the physical constants of newly discovered compounds, was not of the opinion that *all* compounds have a definite composition or that solutions are no true compounds (1819). The determination of physical constants as attributes of some substances undoubtedly led to the conclusion that a deviation from these constants

denoted "impurities" and that a fixed boiling point indicates a definite composition, whereas a variable boiling point (the pressure remaining the same) is a sign of a variable composition. But this does not mean that only substances with definite physical constants and definite composition were considered as chemical compounds or chemical individuals. In general, solutions as well as "compounds of definite composition" were regarded as results of the action of "chemical affinity", produced under development (or absorption) of heat and under partial (or total) alteration of properties. There was only a gradual, not an essential difference between them.

Proust[22] demonstrated fixed proportions for a great number of compounds, but his conclusion that only substances of definite composition are true compounds was not generally accepted as the result of chemical experiment. His opinion could only be justified by at heory that divided homogeneous phases into two *essentially* different groups (viz. compounds and solutions, respectively with constant and varying composition). Berthollet strongly argued that in the case of solids too, some compounds have a definite and others an indefinite composition. In this latter category he reckoned many salts[23], alloys[24], and glasses[25].

The triumph of Dalton's atomic theory and the overwhelming influence of organic chemistry have established the opinion that Berthollet was on the losing side. Nevertheless, a great many chemists and physicists in the 19th century recognized besides definite compounds indefinite ones also, which were not regarded as *essentially* different (Gay-Lussac 1819; Frankenheim 1835; Biot 1836; Poggendorff 1837; Hess 1849; L. Gmelin 1852; Mendelejeff 1865; Guldberg and Waage 1867[26]). Kopp (1863) and Sainte Claire Deville[27] (1864) excluded gas mixtures only from the indefinite compounds because nothing indicates the activity of a special force between the components, i. e. because there was no heat effect and no change of properties accompanying their formation. Gas mixtures were therefore considered mechanical mixtures of which the components are divided to the utmost degree.

Yet it is remarkable that a violent opponent of the atomic theory, C. J. B. Karsten, who reckoned both "indefinite species" (homogeneous liquid mixtures[28]) and "definite species"[29] amongst the true "chemical compounds"[30], held the opinion that practically all homogeneous *solid* substances have a definite composition[31]. He held this view not on theoretical grounds[32], but as a result of experience. The mass of facts, which may be alleged as supporting the Daltonian theory, evidently influenced even him.

3. How could the conviction arise, then, that only definite compounds are true compounds?[33]. From a logical point of view the formation of the idea of chemical species precedes the verdict of the quantitative analysis by which the constancy of composition of a certain species should be established. The enunciation of the law of constant proportions could only be the second step. There is nothing in the initial characteristics of a chemical species (homogeneity; phenomena of its formation) to suggest that all species have a constant composition. Accordingly the idea of fixed proportions of the components of every chemical compound must be the result of theoretical prejudice or of illegitimate extrapolation of experimental data.

The early crystallographers, Romé de Lisle (1783) and Haüy (1784) enunciated the law of constant proportions for solid substances[34], because their theory of crystal structure demanded geometrical units (molécules intégrantes) of constant shape and bulk for every species, which, consequently, should also be composed of elementary atoms in fixed proportion and arrangement: each species is characterized by its geometrical as well as by its chemical type. Also Dalton's stoechiometrical laws are certainly not founded upon chemical analysis (which was very inaccurate) but on theoretical deductions. The chief purpose of his experimental investigations in chemistry was to confirm these deductions, which he deemed, however, already firmly established beforehand. Bryan Higgins, who wrote about chemical combination shortly before Dalton (in 1776), also proceeded by deduction. Like Dalton he based his theories on the chemistry of gases. He arrived at fixed proportions by assigning to all molecules the formula *AB*. William Higgins (1789) arrived at stoechiometrical laws (constant proportions, multiple proportions) also by theoretical deduction. All three deduced the concept of chemical molecule from their ideas about attraction and repulsion between atoms; they made the simplest possible supposition that the particles of a compound are perfectly similar and equal and consequently possess identical stoechiometrical composition. These atomists show a tendency to adjust the results of chemical analysis to their theory[35].

Berzelius who, in his electrochemical dualism, elaborated Dalton's molecular theory, introduced the law of constant proportions with rigidity (1820). He regarded dissolution as a mechanical, nonchemical, phenomenon. Mitscherlich (1831), Graham, Daniell (1843) and other chemists followed him, and even the modern opponents of the atomic theory, the energeticists Wald and Ostwald, underwent the influence of the theory they combatted so obstinately, when they introduced constant

proportions in their "*empirical*" definitions of the chemical individual. According to Wald a chemical individual is a substance which persists as *a phase of constant composition* when the conditions of temperature, pressure, and composition of the other phases present, undergo continuous alteration within certain limits, the limits of existence of the substance[36].

The above exposition shows the following development:

1°. There are chemical individuals (homogeneous phases); their main characteristic is homogeneity. Mechanical mixtures are excluded.

2°. The formation of some of them is accompanied by heat effect, and their properties are not found by simple addition of those of their components. Gas mixtures and solutions of gases in a liquid are excluded, but this is not the case with salt solutions, alloys and mixed crystals.

3°. Chemical individuals containing the same constituents are reckoned to belong to the same species. Some species show fixed proportions; within other species a continuous series of proportions is possible. (Both are the result of "chemical forces").

4°. Species with definite physical constants (boiling point, etc.) appear to have a definite composition. These are "chemical compounds" in the more restricted sense.

5°. From the standpoint of corpuscular theory molecules of the same species are equal; their constituents cannot vary their proportion continuously but only in a discontinuous way. Every species (chemical compound) has a definite composition. Different multiple proportions of the same constituents indicate different species.

4. It seems to be an arbitrary limitation, when a large number of inorganic bodies, evidently belonging to the same group (e. g. sugar solutions of different concentrations) are not reckoned to belong to the same species because they do not answer to a fixed stoechiometrical composition. The "empirical" concepts of "individual" and "species" have always been conceived by the classificatory sciences (natural history), in a certain way. This way should not be abandoned in order to make them conformable to a chemical theory which was already superannuated a hundred years ago[37]. The 20th century accordingly in many respects returned to the original positions. It is a well-known fact that great difficulties beset the biological taxonomist who wants to give a definition of a species. It has been said, with some exaggeration, that there are as many biological species concepts as there are systematists. Even greater

are the difficulties with the chemical species concept. Notions borrowed from organic sciences, where they are hardly satisfactory, are applied to inorganic subjects where they could be expected to give even less satisfaction.

Wald (1897) and Ostwald (1904), wanting to avoid theoretical influences, gave the useful definition of the "chemisches Individuum" as a homogeneous phase, which, when gradually transforming into another phase, keeps a constant composition—or, which seems better, constant properties—within a certain range of temperature and pressure[38]. Yet they identified it more or less with the current concept of "chemische Verbindung", characterized by a definite molecular formula. The first, however, is an empirical, classificatory, natural historical concept, the latter a theoretical concept of mathematical character. Kurnakow[39] (1914) rightly accepted Wald's standpoint; he put forward "chemische *Individuen*" (homogeneous phases) with *constant* composition, and those with *variable* composition (alloys e. g.), and, while maintaining the distinction between the empirical, classificatory and the theoretical, mathematical conception, he assumed, parallel to them, "chemische *Verbindungen*" with *variable* composition and "chemische *Verbindungen*" with *constant* composition. One "chemical compound" of molecular theory may correspond with several "chemische Individuen" of the empirical type[40] (e. g. a compound like $NaNO_3$ corresponds with a molten salt and with several polymorphic forms). On the other hand, he recognized the possibility of "definite" molecules ("compounds") never occurring in a "pure" aggregate, but always in dynamic equilibrium with their polymers. Consequently these would never represent a certain "chemical individual".

Timmermans caused some confusion by applying the term "species" (espèce chimique) to what would be called "Individuum" by Kurnakow (viz. substances of definite composition as well as solutions)[41]. His "individu chimique", however, is symbolized by a certain molecular formula[42]; thus it somehow belongs to the same category as the notions of "molecule" and of "definite compound". He did not go into the question of whether rhombic and monoclinic sulphur, or graphite and diamond, or water and water vapour, are identical "individuals". From his standpoint it seems necessary to regard every pair as identical "individuals", but belonging to two different species!

Ketelaar[43] (1935) regarded only compounds of definite composition, moreover characterized by distinct molecules, which may have an independent diffusion movement (e. g. carbon dioxide, mercuric chloride),

as "chemische verbinding". For them the rules of Dalton should be valid without qualification. As a consequence of this view, in the solid state only substances with molecular lattices could be considered to be "compounds" (verbindingen). He thus abandoned Kurnakow's "indefinite compounds" (Verbindungen unbestimmter Zusammensetzung). By definition a chemical compound here has fixed proportions. The name of "chemisch individu", however, was indifferently applied both to phases representing definite compounds and to phases of variable composition; it is, also according to Ketelaar, an "empirical" concept. In the solid state an "individual" is characterized by a certain "structure type".

It turns out that Timmermans and Ketelaar denote by the term "individual" concepts of a totally different character.

5. In chemistry the notions of "individual" and "species" are often confounded. This confusion can easily arise. A sample of carbon disulphide is a specimen of the species carbon disulphide, but in practice we do not regard this and other samples of the same substance as individuals belonging to the same species. When several bottles are filled from the same store of carbon disulphide we do not regard the separate amounts as separate individuals; when fat is divided into tiny globules in an aqueous emulsion (milk), these droplets belong to the same phase. Consequently, whereas the difference between "this individual dog" and the specific notion of "the dog" is perfectly evident, the difference between "this carbon disulphide" and "carbon disulphide" in general, is hardly felt. We apply the term "individual" to the substance in general (the species) as well as to geometrically limited portions of it (crystals, drops). However, it seems that the term "individual" can only with any right be applied to these latter.

Mineralogists, who as a rule were more aware of the significance of the terminology of classification, did not lapse into this confusion. Haüy (1801) defined the species as "un assemblage de minéraux"[44]. Friederich Mohs pointed out that nature only produces *individuals*; an individual is to him a homogeneous mineral piece (Handstück; crystal); the species is a collection of individuals[45]. J. N. Fuchs (1824) moreover recognized that variability of proportions is possible within the species: "Species ist der Inbegriff von Mineralien, welche gleiche Krystallisation und gleiche oder gleichmäszige (durch Vicariren gleiche) chemische Constitution haben". Here appears for the first time the notion of vicarious elements, as we see e. g. in (Ca, Fe) CO_3.

The rise of crystal chemistry has diminished the preponderant influence of a system of notions borrowed from the chemistry of gases, aqueous solutions and organic compounds; it has again brought together chemistry and mineralogy, which were so closely interwoven at the beginning of the 19th century, and, accordingly, problems which occupied our ancestors are revived nowadays. Thus it might be expected that the concept of "individual" would be reestablished in its true meaning, and that, e. g. the term "individual" would be applied only to limited entities like a *crystal*. Indeed, like L. A. Necker de Saussure in 1835, P. Niggli (1943)[46] considered a *crystal* as a true "individual". Of course the difficulty then remains that liquids and gases have no entities comparable to the crystals of the solid state. Moreover, the crystal as an "individual" harms the analogy with the biological concept of "individual". A cubical crystal of rock salt can easily be split into a large number of smaller cubes, which are again individuals of the same kind. A crystal is not an ultimate unit, like a wolf. Evidently the magnitude of the crystal is irrelevant: it could be very large or extremely small; it does not matter as long as the character of the fragments remains the same. To put it in "theoretical" terms: not the outward form, but the inner structure matters. In this way all advantage over liquids and gases is lost; we have the same difficulties with solids as with liquids when we want to draw a sharp line between the concepts of individual and species.

To establish a better analogy with the biological individual we should continue division to the utmost, that is, until we have arrived at molecules or other separate units. The crystal could then be compared with an aggregate or colony of unicellular beings. The individuals, e. g. the molecules of mercuric chloride, have the property of growing into aggregates of a certain geometrical pattern or of more than one geometrical pattern (polymorphy), or of no definite arrangement at all (liquid phase). In the case of homodesmic crystals with homopolar bonds (zinc blende; diamond), however, the difference between "crystal" and "molecule" disappears. The whole crystal is to be conceived as a giant molecule. In the case of heteropolar bonds (sodium chloride) it could perhaps be maintained that the sodium ions and the chlorine ions are the chemical individuals. Their relation to the species "sodium chloride" is, however, totally different from that of all individual wolves to the species "wolf". Firstly because they do not even belong to the same kind, and, secondly, sodium ions do not present a phase, an empirical object. But we could also in this case maintain that the whole crystal is

one molecule, and thus we are led again into the difficulty that the individual is divisible into individuals of the same kind. Perhaps the best way out would be to use the term "individual" in the crystalline state for the crystal unit, the cell. This has also the advantage that molecular, atomic, homopolar and heteropolar lattices are thus treated in a uniform way. Of course difficulties with defect structures remain.

This solution is bought at a high price. The empirical, positive character of the concept "chemical individual" has disappeared. The concept of individual is now as "theoretical" as that which regarded the "molecule" or the "chemical formula" as representing the chemical individual.

In the latter case this is openly conceded by V. and J. Martinet[47] (1943), who consider molecules (naphtalene, carbon dioxide) and ions (sodium chloride), which have a certain independency of existence in the crystals, as "individus chimiques". They say that in this way the concept of chemical individual "est moins positive, plus spéculative" than that of chemical species[48]. This seems a great disadvantage: in Natural History the individual, a concrete thing, is always more positive than the species, which bears a more abstract character. Another difficulty is, that in this case "individual" and "species" do not belong to the same system of concepts. These authors conceive the *species* wholly in the sense of Ostwald's thermodynamical conception.

Moreover they seem to restrict the notion of species to substances of fixed composition, whereas nothing is said about the states of aggregation, so that their species concept bears a vague character; it is "empirical" as well as "theoretical" and abstract. The individuals have in many cases not a really independent existence; the two-dimensional complex ionic sheets in mica, the -Si-O-fibres in asbestos are regarded as "individus chimiques", as well as the simple atoms or ions which build them up. In the case of a homopolar crystal (zinc blende, diamond), the whole crystal as well as the constituent atoms are regarded as "individuals"[49]. The whole conception does not show a trace of the usual relations between individuals and the species.

It is interesting that the French mineralogist Déodat Dolomieu (1801) sought a solution for the problem of the chemical (or better: mineralogical) individual in the same direction, but in a way which seems more satisfactory. It had been argued against Romé de Lisle and Haüy by Buffon and Daubenton that mineralogical species do not exist, because there are no individuals in inorganic nature. Haüy (1784)[50] (and Romé de Lisle before him[51]) maintained that every mineral species is characterized by

a definite geometrical type (represented by the "primitive form" or the crystal molecule) and by a definite chemical type (represented by the fixed proportions of the elementary constituents[52]). The varying composition of minerals belonging to the same species was attributed to impurities. As these do not affect the geometrical form, this form was considered more reliable for determination of the species than the results of chemical analysis[53].

The difficulty was, however, that these "impurities" occurred in perfectly homogeneous crystals. Dolomieu therefore pointed out that the species is already fully represented by the crystal unit[54], the "molécule intégrante" (characterized by its chemical composition and its geometrical form), which in forming aggregates, may include "souillures" and "superfluités"[55]. The minerals as we meet them in nature are seldom true to the chemical type (they have no fixed proportions), but that does not matter: they are "collections d'individus minéraux"[56]. He distinguished between "l'existence chimique de l'espèce", which already exists in its fulness when there is one crystal molecule, and "l'existence physique de l'espèce", the homogeneous mass formed by the aggregation of these molecules. The latter may be considered as "représentant un individu". Dolomieu recognized that an "individual" could not be divided without losing its existence. Therefore only the "molécule intégrante" is an "individu" in the proper sense. But by a "metaphorical extension" the term should also be applied to the "masse régulière" that results from the aggregation of the molecules.

The species thus has a "double existence": an "occult" one, known by thought only (for the chemical individual, the molécule intégrante, is an "être de raison"), and an "apparent" one, known to the senses[57]. The species includes all individuals, whether conceived in the chemical or the physical way. It is remarkable that Dolomieu by his "physical individual" restored the rights of the empirical concept of mineralogical individual. It is, however, evident that notwithstanding their typically "natural historical" method of defining the species by crystal form, the "theoretical" concept of the "definite chemical compound" is intimately linked with the empirical concept of "individual" in the expositions of Haüy and Dolomieu.

The different kinds of defect structures have lessened the significance of the "chemical" composition and the definite "chemical" molecule in modern crystal chemistry. On the other hand the geometrical type was recognized again as very important, albeit in the modified form of

structure type. However, we would prefer to leave aside the concepts of "elementary cell" and "molecule" and to consider a *homogeneous body as a truly empirical individual* also in mineralogy and crystal chemistry. In that case we should consider a continuous series of mixed crystals as individuals (of different composition) belonging to the same species. Such a species (including the two extreme terms and their mixed crystals) would be comparable to an interbreeding community in biology (a "Formenkreis" of Kleinschmidt, a superspecies). Thus we take a wholly "empirical" standpoint; we do not speak any longer about theoretical notions like "structure type". Moreover, it would be wrong to connect the species too strongly with a certain structure type: the "structure type" does not exactly correspond with this purely "empirical" and experimental concept. Calc spar is isomorphous with magnesite and possesses the same structure type, but these two do not form a continuous series of mixed crystals. Accordingly there are two species (or two series of individuals), viz. (*Ca*, Mg) CO_3 and (*Mg*, Ca) CO_3, possessing only one structure type[58].

Allotropic forms of the same chemical composition, like zinc blende and wurtzite (or diamond and graphite) should be regarded as belonging to different species, but to the same "chemical compound", zinc sulphide (or to the same chemical element, carbon). It seems inconsistent when Niggli, who accepted the above conception of the mineral species, regarded allotropic forms (wurtzite and blende) as belonging to the same species, in spite of their morphological discontinuity.

Of course, as a consequence of this conception, liquid water, water vapour and ice would also be different species, between which a certain unity is established by the concept "chemical compound", H_2O, of molecular theory. The comparison between the one genotype and the many phaenotypes in biology readily presents itself, but we should not forget that these many phaenotypes in biology belong to *the same* species. Whatever way we choose, analogies between biological and inorganic phenomena give rise to objections.

Finally, it could be suggested that we should restrict the term "chemical *individual*" to homogeneous bodies; a *species* consists of individuals, forming a continuous series (of mixed crystals, or of solutions of different concentration). (It must be conceded that gas mixtures present some difficulties). To molecules, atoms, ions and also to elementary cells the name "chemical individual" should not be applied; they should be called "(chemical) units". Of course, here again absolute distinctions cannot be established. Our empirical concepts (essentially concepts borrowed from

the science of heterogeneous equilibria) deal with conglomerates of particles. It is often difficult to decide whether there is a small aggregate or a big particle, and it is also difficult to decide where thermodynamical statistical laws are no longer applicable.

6. We have left aside the intricate problems arising from dynamical allotropy, azeotropic mixtures[59], isotopy, etc. etc. Without that it is clear how great the difficulties are when a system of notions, largely borrowed from the study of animate nature, is applied to inanimate nature (mineralogy) and the confusion which may arise when notions borrowed from classificatory sciences are introduced into a discipline which, as is the case with chemistry, has a mixed character, being an "exact" as well as a "classificatory" science.

Our innate desire for unity is often disappointed when we try to force the phenomena of organic and of inanimate creation into one pattern. It cannot be denied that up till now a large gap has existed. Moreover, if this gap were bridged, the difficulties would not vanish, as even within the realm of biology itself the notions of individual and species meet with many "difficult cases". Nevertheless, this is no reason to be pessimistic: the high degree to which our system of concepts masters the phenomena ought to give us great satisfaction, whereas the insufficiency of the same system is the best proof that we are not chasing our own tail. The very difficulties we, like our ancestors, meet with in trying to catch the phenomena of nature in our system of concepts, give clear evidence that we are not investigating only the creations of our own mind.

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32. *Ibid.* p. 76, p. 5.
33. When van Dalen (*op. cit.* (note 22) p. 12) says, that "about 1810 the constant composition of compounds was generally accepted" his statement should be accepted with qualification.
34. Hooykaas, R.: Arch. Intern. Hist. Sc. 1952, p. 47, 48.
35. De oorspronkelijkheid van Dalton's theorie. Chem. Weekblad 44 (1948) p. 407.
For Dalton's theory, see also our articles in Chem. Weekbl. 44, 229–237; 44, 321–330; 44, 339–343.
36. Wald, F.: Z. phys. Ch. (1897) 24, 648. Findlay, A.: The Phase Rule, 5th ed. New York, 1923, p. 75. Cf. p. 7, n. 2.
37. As Dalton's theory is usually presented in textbooks as a set of stoechiometrical rules, the obsolete character of the theoretical background of these rules is usually overlooked.
38. Ostwald, Wilh.: J. chem. soc. 85 (1904), 511.
39. Kurnakow, N. S.: Z. f. anorg. Ch. 88, (1914), p. 109.
40. *Ibid.* p. 114.
41. Timmermans, J.: La notion d'espèce en chimie, Paris 1928, p. 32.
42. *Ibid.* 37.
43. Ketelaar, J. A. A.: Chem. Weekbl. 32, p. 61.
44. Haüy, R. J.: Traité de minéralogie, vol. I, Paris 1801, p. 162.

45. Mohs, F.: Leichtfaszliche Anfangsgründe der Naturgeschichte des Mineralreichs, Wien 1832, p. 394.
46. Niggli, P.: Annales Guébhard-Séverine, 18–19, p. 319.
47. Martinet, V. et J.: Annales Guébhard-Séverine, 18–19, p. 293.
48. *Ibid.* 295.
49. *Ibid.* 313.
50. Haüy, R. J.: Essai d'une théorie s. l. structure des cristaux, Paris 1784, p. 42.
51. Romé de l'Isle, J. B. L. de: Cristallographie, Paris 1783, I, 74.
52. Haüy, R. J.: Traité de minéralogie I, 162; Haüy, R. J.: Tableau comparatif des résultats de la cristallographie et de l'analyse chimique, etc., Paris 1809, p. X, XIX; Haüy, R. J.: Traité de cristallographie, Paris 1822, T. II, 413.
53. Haüy, R. J.: Tableau etc. p. XV.
54. Dolomieu, D.: Sur la philosophie minéralogique et sur l'espèce minéralogique, Paris 1801, p. 39.
55. *Ibid.* p. 72, 73.
56. *Ibid.* p. 44
57. *Ibid.* p. 58, 60, 63.
58. Winchell, A. N.: Amer. Mineralogist 1949, p. 220; Niggli, loc. cit. (note 46) p. 324.
59. According to Timmermans azeotropic mixtures with their variability of composition at the boiling points at different pressure, are undoubtedly no definite compounds (*op. cit.* (note 41) p. 8), whereas G. Tammann (Lehrbuch der heretogenen Gleichgewichte, Braunschweig 1924, p. 75) assumes "ein mehr oder weniger dissozierte Verbindung beider Komponente", with a changing degree of dissociation, dependent on variation of pressure.

LA CONCEPTION EGYPTIENNE DU SQUELETTE

par

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Notre propos n'est pas d'écrire un chapitre d'anatomie[1]. Dans cette étude, nous avons simplement voulu réunir des données iconographiques – auquelles nous avons joint quelques considérations lexicographiques –, avec l'espoir de découvrir la conception égyptienne du «squelette», en tant qu'entité matérielle.

Pour introduire cet essai, nous confronterons d'abord une page d'un roman des temps néroniens avec un texte d'Hérodote.

Le premier extrait est emprunté à la *Cena Trimalchionis*, que Pétrone introduit dans son Satyricon. Il est tiré du paragraphe 34, où il est dit: «Pendant que nous buvions et que nous admirions dans tous ses détails la somptuosité du festin, un esclave apporta un squelette d'argent ajusté de telle façon que les articulations et les vertèbres, se pliant à volonté, pouvaient se mouvoir en tout sens[2]. Il le jeta deux ou trois fois sur la table, en lui faisant prendre différentes attitudes. Sur quoi Trimalchion déclama:

«Hélas! pauvres humains, nous ne sommes que néant.
Voilà comme nous serons tous, quand la mort nous emportera.
Vivons donc, tant qu'il nous est donné de jouir»[3].

Juxtaposons ces lignes avec le passage du chapitre 78 du Deuxième Livre des *Histoires* d'Hérodote, où nous lisons: «Au cours des réunions chez les riches Egyptiens, après que le repas est terminé, un homme porte à la ronde une figurine de bois dans un cercueil, peinte et sculptée à l'imitation très exacte d'un mort[4] mesurant, en tout, environ une coudée ou deux; il montre cette figure à chacun des convives en lui disant: «Regarde celui-là, et puis bois et prends du plaisir; car une fois mort, tu seras comme lui». Voilà ce qu'ils font pendant qu'ils sont réunis pour boire»[5].

Centaurus 1957: vol. 5: no. 3–4: pp. 323–338

On nous accordera sans peine que le texte latin est une transposition évidente, sinon une transmission de la tradition exposée dans le texte grec. Or celui-ci nous conduit sur les bords du Nil, puisque Hérodote certifie que la coutume qu'il rapporte était proprement *égyptienne*. Si notre informateur a dit vrai, nous devons retrouver dans des documents, *pharaoniques* cette fois, les deux éléments de nos sources gréco-romaines; à savoir: le thème philosophique de l'appel à la jouissance en face de la mort, et la mention du squelette qui est l'objet particulier de nos recherches.

Il ne nous a pas été difficile de repérer, dans les belles-lettres d'Egypte, des compositions directement inspirées de l'invite épicurienne au plaisir: ce sont les fameux «Chants des Harpistes»; ainsi nommés conventionnellement parce que la plupart d'entre eux ont été découverts dans les tombes, gravés à côté de la figure d'un harpiste chargé de récréer éternellement le défunt dans l'autre monde[6]. C'est dans ces poèmes, remontant sans doute au Moyen Empire, qu'apparaît en effet l'exaltation du «Carpe diem» pharaonique. Jugeons-en d'ailleurs par cette tirade de la version classique de l'œuvre qu'un roi Antef avait inscrite dans sa tombe[7].

> «Réjouis ton cœur, pour que ton cœur oublie que tu seras un jour béatifié.[8]
> Suis ton cœur, tant que tu vis,
> Mets de la myrrhe sur ta tête,
> Habille-toi de fine toile,
> Oins-toi de ces vraies merveilles qui sont le partage d'un dieu[9].
> Multiplie tes plaisirs, ne laisse pas s'atténuer ton cœur[10].
> Suis ton cœur et les plaisirs que tu souhaites[11].
> Fais ce que tu veux sur terre. Ne contrains pas ton cœur[12].
> Il viendra pour toi, ce jour des lamentations.
> Le dieu au cœur tranquille n'entend pas les lamentations[13].
> Les cris ne délivrent pas un homme de l'autre monde.
> Refrain(?):
> Fais un jour heureux, sans te lasser,
> Vois, il n'y a personne qui emporte avec lui ses biens [14].
> Vois, nul n'est revenu après s'en être allé».

On connaît une dizaine de variantes de ce poème-type[15]. Examinées parallèlement à nos extraits gréco-romains, on ne peut que conclure à la correspondance spirituelle des textes. Les uns comme les autres évoquent en substance la réalité de la mort et pressent l'homme de vivre de la

manière la plus totale afin de jouir au maximum de l'heure qui passe. Toutefois, remarquons que dans les «Chants des Harpistes» ne surgit jamais la mention du squelette que l'on attendrait en pareille occurrence. Le poète se serait-il abstenu d'user de cette image, trop brutale à son gré? Le fait ne tiendrait-il pas, pour une part au moins, dans une affaire de lexique, le vocabulaire égyptien n'ayant jamais possédé, à ce qu'il semble, d'expression spécifique pour désigner l'entité anatomique que nous appelons squelette?

La constation est assez surprenante, si l'on considère que les habitants, de la vallée du Nil pratiquèrent de bonne heure le démembrement du cadavre humain[16], procédé de «conservation» du corps qui non seulement précéda la momification[17], mais lui survécut même[18]. Rappelons que le principe de cette technique consistait, après décapitation du cadavre, à le dépecer et à inhumer provisoirement les «pièces détachées» dans de la terre arable, afin d'obtenir une rapide décomposition des chairs. Ramenés au jour, après un certain temps, les ossements recueillis étaient alors débarrassés des parties molles encore adhérentes, puis une sépulture définitive leur était réservée dans la nécropole. Ces manipulations répétées, ménageant des contacts aussi directs avec les os «récupérés» – que l'on disposait ensuite, souvent sans ordre[19], mais qu'on agençait parfois de manière à restituer plus ou moins exactement un squelette[20] –, auraient dû logiquement favoriser l'éclosion d'une nomenclature ostéologique. Or, s'il y eut un déclenchement lexicographique de cet ordre, il fut sans ampleur. A preuve le petit nombre de pièces osseuses que l'on peut citer par un vocable qui leur soit propre[21], tels *mḫ'k.t:* l'omoplate[22], les clavicules *bb.wj*[23], la mâchoire inférieure *'r.t* ou *wgj.t*[24], la vertèbre *ṯs* ou *ṯs.t*[25], la côte *śpr*[26], la rotule *pꜣd*[27]. En dehors de ces cas et de quelques autres, la règle égyptienne paraît avoir été – comme le dit Dawson[28] – de considérer chaque membre ou chaque partie du corps comme un tout, englobant dans son revêtement cutané les parties molles sous-jacentes et les segments osseux enfouis au sein de ces tissus[29]. Et ceci justifie peut-être l'absence d'une liste ostéologique complète[30], mais n'explique guère l'absence, dans le vocabulaire anatomique, d'une appellation désignant, en bloc, l'armature si frappante du squelette.

Sans doute la langue égyptienne connaissait-elle le mot *ḳś* 𓄡𓎛𓋴 ou 𓎛𓋴 : *os*,[31]. Et peut-être dira-t-on que son pluriel *ḳś.w* 𓄡𓎛𓋴𓅱𓅱𓅱 ou 𓎛𓋴𓅱𓅱𓅱 : *les os*, employé collectivement, servait à désigner l'ensemble architectural du squelette. Nous avons donc examiné le sens des mots *ḳś*, *ḳśw* partout où on pouvait le rencontrer: dans les papyrus médicaux d'abord[32];

puis dans ces litanies religieuses ou magiques appelées «Listes anatomiques»[33], en raison de l'énumération des parties du corps qu'elles contiennent; enfin, dans quelques textes courants sans prétention anatomique[34]. Nulle part la forme *kś.w* ne s'est imposée comme représentative du concept «ensemble osseux», c'est-à-dire de l'idée «squelette».

Laissons là, momentanément, la prospection des textes pour nous tourner vers l'iconographie.

Deux sources devaient nous apporter, à défaut d'une image de squelette, certaines figures qui laissent «transparaître» leur chevalet osseux. Ce sont les portraits d'individus faméliques et les représentations cadavériques réalistes.

S'il est maintes fois question de «famine» dans les inscriptions égyptiennes – on en a des témoignages s'échelonnant de l'Ancien Empire à l'Epoque romaine[35] – la documentation figurée n'est guère riche en motifs de cet ordre. Les quelques bouviers cachectiques des tombes de Meir (Moyen Empire)[36] et les faméliques provenant de la rampe de la pyramide d'Ounas (Ancien Empire)[37] sont néanmoins des exemples impressionnants des méfaits anatomiques de la famine. Tous les individus, représentés prostrés, sont réduits à leur plus simple expression. Leurs traits sont creusés, leurs épaules sont déformées en portemanteaux, leur thorax affiche le gril costal sur toute sa hauteur[38], leurs reins sont efflanqués, leur bassin étriqué, leurs membres décharnés. Aucun commentaire littéraire n'accompagne ces reliefs[39]; et c'est bien dommage. Car le scribe, chargé de décrire des anatomies frappées à ce point de misère physiologique, n'aurait pu le faire, nous semble-t-il, qu'en les comparant à des «squelettes» - le mot tant attendu. Hélas! ces documents sont irrémédiablement muets.

Passons à l'iconographie naturaliste du mort. Les Egyptiens répugnant à reproduire le défunt à l'état de cadavre, il paraissait improbable de découvrir des esquisses de ce genre. L'imagerie funéraire nous a cependant réservé deux séries de tableaux exceptionnels, dans lesquels le cadavre – silhouette macabre peinte en noir – apparaît à plusieurs reprises. Il s'agit des scènes décorant deux cercueils du Musée de Hildesheim, qui évoquent à nos yeux, dans leur suite chronologique, les principales étapes de la momification[40]. C'est pourquoi nous y verrons effectivement le macchabée, et ce par trois fois: d'abord plongé dans la cuve de natronisation, ensuite couché[41] dans le caniveau de lavage, et enfin étendu sur une claie de séchage, dernier stade avant l'emmaillotement[42].

Nous rapprocherons de ces figurations une silhouette semblable que

donne l'exemplaire du Livre des Morts, conservé au Musée du Caire sous le nom de Papyrus de Boulaq 21. Dans ce document, le chapitre 89 est, en effet, orné d'une vignette où l'on voit notre cadavre étendu sur un lit, un faucon volant au-dessus de lui[43], curieuse représentation qui semble avoir échappé aux égyptologues.

Il n'en est pas de même d'une autre image – identique à la nôtre – tirée du Papyrus funéraire du Louvre n° 3074[44] et déjà signalée par Maspero[45] et Devéria[46]. Grâce à un cliché publié par Dawson[47], on peut juger de l'habitus beaucoup plus réaliste conféré dans ce cas à la dépouille mortelle, qualifiée de «cadavre noir décharné» par ces premiers auteurs. Sur cette vignette, illustrant le chapitre 85 du Livre des Morts, le sujet, exposé sur une sorte de matelas, revêt effectivement l'aspect d'un corps aux formes altérées, aux membres raccornis, visiblement desséché par la momification.

C'est une silhouette du même type qui, dans la tombe d'une femme de l'époque ptolémaïque, fait une double apparition[48]. Mais l'étrange individu de couleur noire n'y joue qu'un rôle accessoire. Personnage secondaire, il se borne à suivre la défunte, à mimer ses gestes[49] et à assister, en spectateur, à ce qui se passe [50]. Ce qui fera dire à d'aucuns que nous n'avons pas affaire ici à l'image du «cadavre» – l'ombre squelettique –, mais à la présence de «l'ombre noire» la *ḫ3jb.t*[51], une des âmes qui accompagnent le défunt dans l'au-delà. Remarquons toutefois que les contours caricaturaux de cette ombre correspondent davantage au schéma du cadavre décharné qu'à l'ombre d'un corps à morphologie externe normale, sous laquelle est généralement matérialisée la *ḫ3jb.t*[52]. Les deux thèses nous paraissent d'ailleurs pouvoir facilement se concilier en ce sens que, dans cette tombe tardive, où l'influence grecque le dispute à la tradition égyptienne, l'artiste a mêlé dans une seule figure – par une sorte de compromis voulu ou de confusion involontaire – la conception graphique de l'ombre noire à l'image de la dépouille cadavérique.

D'une façon générale, toutes ces silhouettes, d'allure combien typiques, nous rapprochent singulièrement d'une représentation plastique du squelette, vers laquelle nous avaient déjà acheminé les documents «faméliques». Car les «scribes des contours», qui ont tracé ces schémas réalistes de corps momifiés, ont visiblement mis l'accent sur l'image d'une carcasse dont ils ont souligné – parfois à plaisir – le détail osseux du rachis cervical, les saillies acromiales des épaules, le pincement de la taille parfois réduite à l'épaisseur de la colonne lombaire, les reliefs olécrâniens des coudes et les proéminences rotuliennes des articulations du genou.

Cette ressemblance – sinon cette assimilation – du «décharné» avec le

squelette vrai va se marquer davantage encore sur une pièce extraordinaire de la collection von Bissing[53]. Il s'agit d'une petite statuette en bois, de style empêchant toute datation, que l'auteur qualifie sans hésiter de squelette; ce qui peut se justifier par le «modelé osseux» de l'ensemble du torse: les contours heurtés de la cage thoracique, nettement délimitée du cou; le carénage accusé de la région sternale; les méplats triangulaires, exactement orientés, des zones scapulaires; la notation de l'angle xyphoïdien; le surplomb du rebord costal antérieur; la schématisation de l'épine dorsale, où se marquent avec netteté les saillies superposées des corps vertébraux; l'«escamotage» – par excavation – du segment abdominal de la figure, auquel fait suite l'ébauche maladroite d'un bassin volontairement réduit à ses lignes essentielles.

Mais, en fait, il ne faut pas se leurrer: en dépit de tous ces «accents» osseux, le sujet sculpté en impose davantage pour la reproduction fidèle d'un corps momifié que pour la copie d'après nature de sa charpente interne[54]. Ce qui n'exclut pas l'idée que toutes les représentations de cet ordre étaient pour les Egyptiens les «substituts intellectuels» du squelette proprement dit. Cette dernière conception, que nous pourrions appeler celle du «squelette suggéré», devait nous conduire à rechercher – et à trouver, du moins le pensons-nous – le terme évoquant l'image ainsi «transposée» du squelette.

Notre point de départ fut une formule trouvée sur un monument que possédaient autrefois les Musées royaux d'Art et d'Histoire de Bruxelles: un grand sarcophage de pierre[55] - détruit par l'incendie de 1946 – ayant appartenu à un personnage de la XIXe dynastie, le nommé Youpa[56]. La cuve, incrite et décorée, offrait du côté de la tête – dans la colonne 42[57] – la locution suivante: *mdw . k r nb-'nḫ* qui, prise littéralement, se rend par «ton bâton pour le maître de la vie», en fait, «ton bâton pour le cercueil»[58]. La voici, replacée dans le texte consistant en paroles «à dire par Nephthys» (37): *rdï.n.ï n.k ïb.k r ḥ.t.k* (38) *hꜣtj.k mn* (39) *hr mk . t. f* (40) *bꜣ.k r p.t* (41) *ḥꜣ.t.k r dwꜣ.t* (42) *mdw.k r nb-'nḫ* (43) *'wj.[ï] ḥꜣ.k m 'nḫ wꜣś*. Soit: (37) Je t'ai donné ton cœur dans ton corps; (38) ton cœur est établi (39) pour sa protection. (40) Ton âme est pour le ciel, (41) ton cadavre est pour la Douat, (42) ton *mdw* est pour le cercueil. Mes bras sont derrière toi, en vie et prospérité»[59].

Cette expression du *mdw* – bâton, nous avons pu la retrouver, en dehors de l'exemple cité, dans cinq autres cas: quatre de la XVIIIe dynastie et un de la XIXe dynatie. Dans ceux-ci le mot *mdw* est chaque fois inséré dans une phrase complète que l'on peut ramener à ce type: *śwd mdw n nb-'nḫ* et traduire «confier le bâton au cercueil». Voici ces références[60]:

I. Chez *Djehouti*[61], personnage contemporain d'Hatshepsout et de Thoutmès III, on trouve notre expression sur la stèle – reconstituée par Sethe[62] – occupant la paroi nord de la première chambre de la tombe[63]. On peut lire en effet: ... *m-ḫt ḥp.t.ṯn tp tꜣ śwḏ.ṯn mdw n nb-ʿnḫ m hś.wt n.wt nṯr.w. nb.w*» ... après votre mort (littéralement: après votre passage sur terre); vous confierez le bâton au cercueil, dans la faveur de tous les dieux»[64].

2. Le musée de Bologne conserve un statue représentant un homme – acéphale – en station assise répondant au nom de *Hapouseneb*[65], lequel fit carrière sous Thoutmès Ier et Hatshepsout. Dans l'inscription du flanc droit – à la ligne 3 – est reproduite notre expression. La voici avec son contexte[66]: *śwḏ.t mdw n nb-ʿnḫ bꜣ n p.t ḫꜣ.t n dwꜣ.t* «Confier le bâton au cercueil, l'âme au ciel, le cadavre à la Douat»[67].

3. *Amenhotep, fils de Hapou*, célèbre contemporain d'Aménophis III, possède plusieurs statues dont l'une – du type de la statue-bloc[68] – est littéralement couverte d'inscriptions. C'est la ligne 2 de ce texte qui renferme la phrase stéréotypée: *śwḏ.k mdw n nb-ʿnḫ*[69] *bꜣ n p.t*, «Puisses-tu confier le bâton au cercueil, l'âme au ciel ...».

4. Un autre *Amenhotep*, également sujet d'Aménophis III, nous est connu par une statue sans tête, le représentant dans la position classique du scribe[70]. Dans la ligne 24 du texte de ce monument figure la formule suivante: [illegible] *cnḫ* fort semblable, à peu de chose près, à celle de nos exemples précédents. En fait, nous pouvons dire que la locution est identique, une erreur de transcription étant seule responsable de la substitution au signe [illegible] *mdw* du groupe incompréhensible [illegible]. La voici replacée dans son contexte: *ph.n.ỉ ꜣmꜣḫ m hsw.t njśw.t śwḏ.[n].ỉ mdw n nb-ʿnḫ m-ḫt ỉꜣwj wꜣḥ ḫnm.n.ỉ tph.t ꜣmj[.t ḥḥ]*[71]. Ce qui donne: «J'ai atteint la féauté, dans la faveur du roi, j'ai confié le bâton au cercueil, après une longue vieillesse, je me suis réuni au tombeau[72]».

5. Dans la tombe d'*Ouserhat*, personnage ramesside[73], on a recueilli trois fragments de grès ayant appartenu à l'encadrement de la porte d'entrée[74]. L'une de ces pierres nous dira: ... *ḫnm.k ỉ".k* ... *śwḏ.n.k mdw.k n nb-ʿnḫ* ... «... tu te réunis à la tombe ... tu as confié ton bâton au cercueil ...»[75].

6. *Youpa* (*Ip*), cité ici pour mémoire[76].

Cette tournure, affirmant par six fois[77] la «transmission du bâton au cercueil», n'avait pas échappé à Grapow[78], mais, pour lui, le «bâton» que le vieillard confie au «maître de la vie» est proprement la canne de dignitaire qui, à la mort de son propriétaire, est généralement jointe, dans le cercueil, au cadavre.

Pour nous, au contraire, le «bâton» qui est mis en ligne – dans les formules de Youpa notamment – avec le cœur, l'âme et le corps, ne pouvait que revêtir un sens métaphorique[79]. Capart en avait déjà fait la remarque. Il écrivait en effet: «Il faut, je crois, reconnaître dans le «bâton» une expression rare pour désigner la dépouille charnelle». Mais il ajoutait aussitôt: «Il est malaisé de découvrir la distinction que l'on pourrait établir entre le cadavre qui est dans la Douat et le «bâton» qui est attribué au sarcophage»[80]. Nous proposons de voir, dans le cadavre *hꜣ.t*, le corps putrescible voué à la destruction, tandis que *mdw* désignerait le corps préservé, conservé par la momification, avec l'aspect que celle-ci confère aux restes humains: celui d'un «squelette camouflé». Il nous paraît que si le sens – ou les sens – de *mdw* arrive à cadrer avec l'attribution «squelette», notre suggestion pourrait être valablement retenue.

Or, il se fait que cette condition est largement remplie, puisque aussi bien chacune des trois significations principales du mot *mdw* peut évoquer le tuteur du corps humain. En effet, *mdw* = bâton[81] peut parfaitement passer pour une allusion à la dépouille mortelle réduite à sa plus simple expression, au cadavre décharné dont il ne reste que les os[82]. La signification *mdw* = arbre[83] peut imposer, elle aussi, l'image du squelette, le tronc garni de ses branches principales formant l'âme de l'arbre feuillu, comme le squelette constitue l'armature interne du corps humain[84]. Et c'est toujours au squelette qu'on est ramené si l'on songe à *mdw* = bois[85], ce corps dur, résistant et solide, en principe, étant très proche, par ces caractères mêmes – y compris la cassure éventuelle – du matériau osseux de notre charpente, enfouie au sein des «chairs» vouées, elles, à la destruction[86].

Ainsi, ces données lexicographiques concordantes s'accordent à appuyer notre hypothèse selon laquelle, dans les locutions exprimant l'idée d'une «transmission au cercueil du *mdw*», le mot *mdw* sert à personnifier, sinon le squelette[87], du moins le *corps momifié, d'apparence squelettique*. Nous avons vu, par ailleurs, que les documents de «famine», les représentations cadavériques naturalistes, la statuette de von Bissing surtout, en étaient autant de témoignages iconographiques. Mais il faut bien reconnaître qu'une image vraie de la charpente osseuse, reproduite pour elle-même, n'est jamais arrivée jusqu'à nous, pas plus que le vocable correspondant.

Il ne nous reste plus, pour conclure cette étude, qu'à nous demander ce que fut exactement l'objet que les sujets de Pharaon faisaient circuler, aux dires d'Hérodote, au cours de leurs banquets, à titre de *memento mori*. Si nous considérons le récit de Pétrone comme un héritage possible d'une

tradition venue d'Egypte, soit directement par Alexandrie, soit par la voie indirecte de l'Asie mineure et de la Grèce classique – les deux courants pouvant atteindre la Rome impériale –, «l'excitant», invitant les habitants de la Vallée du Nil au «vivamus atque amemus»[88], aurait été le squelette. Le mot *larva* de l'auteur latin en fait foi. Ce qu'infirment hélas! les notions égyptiennes que nous venons d'exposer au sujet de cette entité anatomique.

Mais relisons Hérodote qui alla, lui, directement aux sources – au Ve siècle avant notre ère, il est vrai. On note que, dans le passage mentionnant la fameuse «figurine de bois dans un cercueil», l'historien grec recourt simplement au terme *νεκρος : un mort*, dont l'imprécision ne manque pas de laisser, aujourd'hui, le champ libre aux interprétations. En vérité, les suppositions les plus diverses ont été avancées. On y a vu :une image du personnage d'Osiris, dieu des morts; un oushebti – cette figurine du défunt – dont on a trouvé des exemplaires dans de petits cercueils[89]; un modèle de momie tout emmaillotée. A choisir entre ces trois possibilités, c'est à la dernière – contrairement à l'avis général des auteurs[90] – que nous donnerions la préférence. Hérodote ne mentionne-t-il pas en effet, dans un autre passage de ses souvenirs[91], l'existence de ces *παραδείγματα νεκρῶν ξύλινα τῇ γραφῇ μεμινημένα*, des «modèles de morts en bois, peints au naturel». Maquettes diverses, soumises à la famille qui devait décider de la «classe» d'embaumement du défunt[92].

Mais il nous semble qu'il y ait place encore pour une quatrième suggestion: Pourquoi le *νεκρός* des banquets égyptiens n'aurait-il pas été un «décharné» analogue à la statuette von Bissing? L'habitus misérable d'un tel modèle, exposant sa macabre nudité, devait être plus spectaculaire qu'une momie habillée et parée, pour frapper l'imagination des convives et leur rappeler les horreurs physiques de la fin dernière. Si l'édifiant «accessoire cadavérique» d'Hérodote fut effectivement cette *anatomie squelettique*, le squelette vrai de Pétrone peut être considéré comme son héritier direct. Matérialisation de l'idée virtuellement contenue dans la momie égyptienne qui, il y a 5.000 ans déjà, poussait les hommes à ne pas attendre demain pour vivre, en les invitant, sans tarder davantage, à «faire un jour heureux».[93]

NOTES

1. Nous renvoyons ceux qu'intéresse l'ostéologie proprement dite aux deux ouvrages récents: G. Lefebvre, *Tableau des parties du corps humain mentionnés par les Egyptiens*. Supplém. aux. *Ann. Serv. Ant.* Cahier n° 17, 73 p., Le Caire 1952, et H. Grapow, *Anatomie und Physiologie* (*Grundriss der Medizin der alten Ägypter*,) Berlin 1954, 102 p.

2. «... larvam argenteam attulit servus sic aptatam, ut articuli ejus vertebraeque laxatae in omnem partem flecterentur».
3. Traduction de P. Thomas (*Pétrone, Le Dîner chez Trimalchion*, Bruxelles, 1923). A. Ernout a donné une traduction de tout le *Satyricon* dans la «Collection Budé» (Ie éd. 1923, 2e éd. 1931).
4. *περιφέρει ἀνὴρ νεκρόν ἐν σορῷ ξύλινον πεποιημένον, μεμιμημένον ἐς τὰ μάλιστα καὶ γραφῇ καὶ ἔργῳ ...*
5. Traduction de Ph.-E. Legrand (Collection des Universités de France, publiée sous le patronage de l'Association Guillaume Budé).
6. Cf. M. Lichtheim, *The Songs of the Harpers*, *Journ. Near East. Stud.* t. IV, nº 3, 1945, p. 178–212 + VII pl.; W. M. Müller, *Die Liebespoesie der alten Ägypter*, Leipzig 1899, p. 29 sqq. «Die Verschiedenen Rezensionen des Manerosliedes».
7. Cette œuvre nous est connue par une copie de scribe, insérée dans un recueil de chants amoureux, le papyrus Harris 500 (VI, 2–VII, 3), conservé au Brit. Mus. sous le nº 10.060. Nous donnons la traduction du texte d'après P. Gilbert, *La Poésie égyptienne*, 2e éd. Bruxelles 1949, p. 90.
8. Litt.: «Pour que ton cœur oublie l'accomplissement des rites funéraires pour toi».
9. Litt.: «Qui sont des choses du dieu».
10. Litt.: «Ajoute à tes choses agréables, (ne) laisse (pas) ton cœur être abattu».
11. Litt.: «Suis ton cœur et ce qui t'est cher».
12. Litt.: «Agis sur terre pour toi selon l'impulsion de ton cœur».
13. Litt.: «Quand le Découragé – Osiris – n'entend pas leurs plaintes, et que les cris ...».
14. Litt.: «... il n'est permis à personne de prendre ses biens avec soi».
15. Cf. M. Lichtheim, *op. cit.*, (note 6) où l'on trouvera, en appendice, la bibliographie complète de «Chants des Harpistes» copiés sur les monuments du Nouvel Empire.
16. Cf. A. Wiedemann, *Das alte Ägypten*, Heidelberg 1920 (Behandlung des Toten. nº 85, p. 108 et 109), et H. Bonnet, *Reallexikon der ägyptischen Religionsgeschichte*, (voir «Leichenzerstückelung» p. 421–423).
17. Les débuts de la momification se placent vers la fin de la IIe dynastie. Cf. G. E. Smith, *Egyptian Mummies*, *Journ. Egypt. Arch.*, X. 1, 1914, p. 189–196.
18. W. M. F. Petrie, *Deshasheh*, Londres 1898, cite toute une série de tombes de la Ve dynastie, avec corps démembrés. Voir pl. XXXV.
19. Cf. W. M. F. Petrie, *op. cit.* (note 18) pl. XXXVII. Cette planche est reproduite dans F. Jonckheere, *Autour de l'Autopsie d'une momie*, Bruxelles 1942, fig. 5 a et b, et p. 15–16.
20. Il faut noter que cette restauration était rarement anatomique comme le prouvent les exemples groupés dans W. M. F. Petrie, G. Wainwright, E. Mackay, *The Labyrinth, Gerzeh and Mazghuneh*, Londres 1912 (p. 14–15).
21. Consulter: G. Lefebvre, *op. cit.* (note 1), et H. Grapow, *op. cit.* (note 1).
22. Dictionnaire de Berlin (W. B.) II, 133.
23. W. B. I, 455.
24. W. B. I, 209 et I, 376.
25. W. B. V, 400.
26. W. B. IV, 101.
27. W. B. I, 500.
28. W. R. Dawson, *Three Anatomical Terms*, *Zeitschr. f. aeg. Spr.*, t. 62, 1927, p. 20–23.

29. A cet égard, G. Lefebvre, *op. cit.* (note 1) paraît manquer de prudence lorsqu'il donne à *rmn*, bras, la valeur d'humérus; en inscrivant radius et cubitus après ', l'avant-bras; en traduisant *mnt*, non seulement par cuisse, mais aussi par fémur; ou lorsqu'il écrit les mots tibia et péroné à propos de *ṯdḥ*, la jambe. C'est risquer d'attribuer aux Egyptiens un vocabulaire anatomique qu'ils n'ont jamais formulé. Nous préférons la position de H. Grapow, *op. cit.* (note 1), que ne tentent aucune de ces suggestions.
30. Ainsi que l'absence d'une description détaillée des os «reconnus».
31. W. B. V, 68.
32. Cf. papyrus Hearst, n° 10–14, 217–227, 233–234; papyrus de Berlin, n° 167 et 173; papyrus Ebers, n° 636; papyrus de Londres, n° 4; papyrus Smith, n° 1, n° 2, n° 4–n° 7, n° 10, n° 18, n° 20, n° 22, n° 27, n° 29, n° 34, n° 40 et n° 42.
33. On trouvera dans G. Lefebvre, *op. cit.* (note 1), p. 2–3, le relevé des principales «Listes» de ce genre. On pourrait ajouter cependant: W. Spiegelberg, *Aus der Strassburger Sammlung demotischen Ostraka*, *Zeitschr. f. aeg. Spr.*, t. 50, 1912, p. 28 (Demot. Ostrak. V); H. Ranke, *Die Vergottung der Glieder des menschlichen Körpers bei den Ägyptern*, *Or. Lit. Zeit.*, XXVII, 1924, n° 10 (col. 558–564); S. Schott, *Urkunden mythologischen Inhalts*, 2. Heft, Leipzig 1939 (pap. BM. n° 10252 et pap. Louvre n° 3129); S. Sauneron, *Rituel de l'Embaumement*, Caire 1952, p. 51–52 (Index des parties du corps d'après Boulaq III et Louvre 5. 158). Depuis 1952, on connaît encore: C. De Wit, *A New Version of Spell* 181 *of the Book of the Dead*, *Bibl. Orient.* n° 3–4, mai–juillet 1953, p. 90–94 (Version parallèle de la Litanie du Soleil du papyrus de Katseshni, p. 93). B. H. Stricker, *De grote Zeeslang*, *Meded. en Verh. n°* 10 *v. het Vooraz.-egypt. Gen.* «*Ex. Or. Lux*», 1953 (voir p. 20).
34. Ex.: Les Maximes de Ptahhotep (pap. Prisse V, I), le papyrus Westcar (10,10); les Textes de Pyramides (308d; 1801b).
35. Cf. J. Vandier, *La Famine dans l'Egypte ancienne*, *Publications de l'Inst. Franc. Arch. Orient.* t. VII, Le Caire 1936.
36. A. M. Blackman, *The Rock Tombs of Meir*, t. I, voir schéma pl. III, relief pl. XX, fig. 1 et aussi pl. XXV, fig. 3 (relief) et pl. XXXI, fig. 2 (repr. coul.). *Op. cit.*, t. II, voir schéma pl. VI et relief pl. XXX. On trouvera ces trois figures-en schémas agrandis-dans *op. cit.*, t. II, pl. XIX, fig. 1 et 2, et pl. XX, fig. 4. Ces personnages sont des Bedjas colonisant les confins du désert où la famine régnait à l'état endémique.
37. E. Drioton, *Une Représentation de la famine sur un bas-relief égyptien de la Ve dynastie*, *Bull. Inst. Eg*, t. 25, Session 1942–1943, p. 45–54, 9 fig.; voir aussi: J. Vandier, *Acquisitions du Département des antiquités égyptiennes*, *Musées de France*, 1950, p. 29, fig. 4, un fragment de la même rampe représentant deux Bédjas affamés, d'une maigreur squelettique (Louvre, E. 17. 376).
38. Signalons encore cette particularité sur deux autres œuvres égyptiennes: la statuette d'un misérable potier, trouvée chez Nanoupkaou (Chicago) dont le dos zébré de raies horizontales figurant les arcs costaux (Cf. J. Capart, *Choix de documents*, t. II, Statuaire, pl. 266). Un bas-relief de Berlin représentant un porteur – tiré du mastaba de Persen – dont les côtes apparaissent au niveau de la région antéro-latérale de la cage thoracique. Notons que ce détail anatomique n'apparaît pas normalement dans l'art égyptien, alors qu'il est courant sur les personnages des bas-reliefs assyriens.
39. Un texte du Nouvel Empire pourrait leur servir de légende humoristique. Cf. A. H. Gardiner, *Egyptian Hieratic Texts*, *Series I: Literary Texts of the New Kingdom*, Part I. Leipzig 1911 (papyrus Anastasi I, 10,2–10,6) (voir p. 13 pour la traduction). Parlant

d'un personnage Kisep, sans doute fort maigre, on nous dit: «Il se déplace sur le sol inaperçu . . . Si tu le vois le soir dans l'obscurité tu diras: c'est un oiseau qui passe. Mets-le sur la balance pour connaître son poids: cela se résume à 20 *dében*. Si tu souffles lorsqu'il passe à ton côté, il ira tomber au loin à la manière d'une feuille d'arbre».

40. Ces deux cercueils provenant de el-Hibeh appartiennent respectivement à la Dame Moutardis et au père divin Djed-Bastet-ioufankh. Cf. G. Roeder, *Die Denkmäler des Pelizaeus-Museum zu Hildesheim*, 2e éd. 1921. Voir p. 99, fig. 35, le cercueil de Moutardis sous le n° 1953 er celui de Djed-Bastet-ioufankh sous le n° 1954.
41. En réalité le corps est représenté *debout* dans une fosse à deux escaliers; il faut l'y supposer couché.
42. On pourra examiner le détail de ces scènes sur les clichés accompagnant l'article de J. Capart, *A propos du cercueil d'argent du roi Chechonq*, *Chron. d'Eg.*, n° 36, juillet 1943, p. 191–198. Voir chez Moutardis les fig. 26 et 27 et chez Djed-Bastet-ioufankh la fig. 29.
43. E. Naville, *Das aegyptische Totenbuch*, Berlin 1887. Pl. 101 (du chapitre 89, celui «d'unir l'âme au corps dans le monde infernal»). Vignette illustrant la copie du L. d. M. dite C c, fait au nom du scribe Amenhotep. (Caire, Boulaq 21). Cf. A Mariette, *Papyrus de Boulaq*, t. III, pl. 4.
44. E. Naville, *op. cit.* (note 43), pl. 97 (du chapitre 85, celui de «procéder à la transformation en une âme vivante»). Vignette illustrant la copie du L. d. M. dite P c (Louvre III, 89, Inv. n° 3074).
45. G. Maspero, *Etudes de mythologie* . . . t. 3, p. 403 (où la vignette est considérée, erronément, comme illustrant le chapitre 84 du L. d. M.).
46. Th. Devéria, *Catalogue des manuscrits égyptiens* . . . *Paris* 1881, p. 115 (III. 89. Papyrus de Tenena, et non de Nefer-ouben, comme le prétend *S. Gabra*. Voir *op. cit. de la note* 48.) Représentation qualifiée de «très rare et peut-être unique».
47. W. R. Dawson, *A Rare Vignette from the Book of the Dead*, *Journ. Egypt. Arch.* t. 10, 1924, p. 40 et pl. VIII.
48. S. Gabra, *Rapport sur les fouilles d'Hermopolis-Ouest* (*Touna el-Gebel*). Le Caire 1941. Voir Ch. V (p. 40–50) ainsi que les pl. XIII, 2 et XIV, 2 (Maison n° 21, salle d'entrée, mur est - défunte habillée à l'égyptienne- et mur ouest-défunte habillée à la grecque). Dans *Illustrated London News*, 8 juin 1935, p. 1019, on oppose la scène où la défunte est habillée à l'égyptienne (fig. 1), à la purification rituelle (fig. 2) où la dame est vêtue à la grecque.
49. Dans la scène «à l'égyptienne», l'ombre noire est dans l'attitude de l'adoration, très proche de l'allure donnée à la défunte. Dans la scène «à la grecque» - aspersion de la défunte - l'ombre noire a pris exactement la pose de son modèle vivant: les bras pendants, légèrement écartés du corps, les mains nettement déviées en dehors.
50. L'ombre noire de la dépouille paraît notamment prendre grand intérêt à la lustration symbolique dont la défunte est directement l'objet.
51. W. B. III, p. 225. Cf. S. Birch *On the Shade or Shadow of the Dead*, *Trans. Soc. Bibl. Arch.* t. 8, 1883–85, p. 386–397; et H. Kees, *Totenglauben* . . . Leipzig 1926, sub *Schatten*, p. 81 sqq.
52. Voici quelques exemples de cette «ombre portée» à contours normaux-tracée suivant les mêmes règles de la descriptive égyptienne que les figures vraies: E. Lefebure, *Le Tombeau de Seti Ier. Mém. Miss. Arch. Franç. Caire*, Paris 1886. Voir la 3e Partie, pl.

III, quatrième corridor, paroi gauche (fin) col. n° 49 (en bas). E. Naville, *op. cit.* (note 43), pl. 104 se rapportant au chap n° 92, dans le L. d. M., copie P c. Le papyrus de Nefer-Renpet, Livre des Morts de la XVIIIe dynastie, conservé aux Musées royaux d'Art et d'Histoire de Bruxelles, offre une vignette illustrant le chapitre 92 – celui «d'ouvrir le tombeau à l'âme et à son ombre» – où l'ombre du mort se dresse devant la porte de son tombeau. Cf. L. Speleers, *Le Papyrus de Nefer-Renpet. Un Livre des Morts de la XVIIIe dynastie aux Musées royaux du Cinquantenaire à Bruxelles*, Bruxelles 1917. (Voir Pl. XXVII, fig. 52). Dans M. Baud, *Le Dessin par ombre portée en Egypte d'après les textes de Pline l'Ancien*, *Chron. d'Eg.* n° 21, janvier 1936, p. 44 on trouvera schématisée «l'ombre du soleil sortant de son naos», tirée de la tombe n° 218 (plafond) de Deir el-Medineh. A. Lhote, *Les Chefs d'oeuvres de la Peinture égyptienne*, Paris Hachette, 1954, donne une photo de «l'ombre» de Iri-Nefer, de sa tombe de Deir el-Medineh (n° 290).

53. Fr. W. von Bissing, *Die älteste Darstellung eines Skelettes*, *Zeitschr. f. aeg. Spr.*, t. 50, 1912 p. 63–65. (Voir la figure p. 65, reproduction de l'objet original qui n'a que 0,034 m. de haut. Il prend place dans un «écrin» en forme d'obélisque qui a 0,05 m de long). La pièce est conservée au Kestnermuseum de Hanovre, sous le n° 1950, 179.
54. Il suffit de regarder la tête et les membres de la figurine. Ce que von Bissing reconnaît d'ailleurs, bien qu'il ait donné à son étude le titre équivoque de «Die älteste Darstellung eines *Skeletts*». L'insertion, dans ce titre, du mot «angeblich» aurait mis les choses à leur place.
55. Monument qui portait le n° d'inventaire E 5189. Cuve en granit de 230/118/138 cm. Couvercle en grès, de 49 cm. d'épaisseur, représentant une figure humaine. Texte couvrant couvercle et cuve, accompagné de représentations sculptées. (Anc. Collect. Léopold II). On trouvera une statue du personnage au Caire. Cf. L. Borchardt, *Statuen und Statuetten von Königen und Privatleuten*, n° 1–n° 1294, 2e partie, Berlin 1925. Voir n° 567 (p. 117–118) et pl. 96.
56. H. Ranke, *Die ägyptischen Personennamen*, t. I, cite ce nom à la page 55, sous le n° 26, en tant que *'Ip*.
57. Numérotation d'après Speleers, *Recueil des inscriptions égyptiennes des Musées Royaux du Cinquantenaire à Bruxelles*, 1923. Voir n° 278, p. 66–68.
58. Le mot *nb-'nḫ* «maître de la vie» est en effet l'expression consacrée pour le cercueil Cf. *W. B.* II, p. 228, 14.
59. Formule extensive de Pyr. § 474 d'où l'on trouve: «L'âme pour le ciel, le cadavre pour la terre».
60. Nous tenons à remercier ici, très vivement le Prof. B. van de Walle, de l'Université de Liège, à l'érudition de qui nous devons la connaissance de ces passages.
61. Tombe thébaine de Dra Abou en-Negga (N° 11 de la nomenclature de B. Porter et R. B. L. Moss, *The Theban Necropolis*, Oxford 1927).
62. Cf. Marquis of Northampton, W. Spiegelberg, P. E. Newberry, *Theban Necropolis*, Londres 1908. Voir pl. XXXIV (ligne 27).
63. Il existe une deuxième stèle, dite de Northampton (Cf. Marquis of Northampton, W. Spiegelberg, P. E. Newberry, *op. cit.* (note 62), pl. I).
64. Cf. K. Sethe, *Urkunden der XVIIIen Dynastie*, IV, 440, 3 à 5.
65. Cf. G. Kminek-Szedlo, *Catalogo di Antichità Egizii*, Turin 1895. Voir p. 156 sous le n° 1822. Il existe d'autres statues de ce personnage contemporain d'Hatshepsout. Voir notamment la statue n° 648 du Musée du Caire et une autre au Louvre (A134).

66. Cf. K. Sethe, *op. cit.* (note 64), IV, 481, 4–5.
67. G. Lefebvre (*Histoire des Grands Prêtres d'Amon de Karnak*, Paris 1929; v. Hapouseneb, p. 76) a porté son attention sur un autre passage de la même statue (Cf. *Urk.* IV, 484, 1. 14) où on trouve la variante: « Mon âme est au ciel, mon corps au sépulcre -*ꜣmḥ.t* = enfer » (Cf. p. 81).
68. L. Borchardt, *Statuen und Statuetten von Königen und Privatleuten*, nº 1–nº 1294, 2e partie, Berlin 1925. Voir nº 583 (Cf. pl. 100 à 104). Pour le texte: p. 134–139. (spécialement p. 135).
69. La transcription figurant au Cat. Gén. Caire comporte [illegible] mis pour [illegible].
70. W. M. F. Petrie, *Tarkhan I -Memphis V* (Brit. School of Arch. in Egypt and Eg. Res. Acc., 18th year, 1912), Londres 1913. Voir la pl. LXXVIII (En bas à droite).
71. Complété d'après W. B. V, 365. Litt.: «la grotte qui est dans l'éternité»; d'où l'éternité du tombeau.
72. W. M. F. Petrie, *op. cit.* (note 70) pl. LXXX.
73. Tombe thébaine nº 51. Cf. N. de G. Davies, *Two Ramesside Tombs at Thebes*, Robb de Peyster Tytus Memorial Series, vol. V. New York 1927.
74. N. de G. Davies, *op. cit.* (note 73) Cf. pl. XIX (*Fragments and Graffiti*); fig. 5.
75. L'expression concernant le «leg du bâton» a frappé Davies, mais il se borne à la commenter en ces termes: «That is, shall lie down to rest». Cf. N. De G. Davies, *op. cit.* (note 73), p. 4 et 23.
76. Voir p. 10 et note 1.
77. Sur un sarcophage, une stèle, trois statues de «double» et une entrée de tombeau, tous monuments du Nouvel Empire à caractère funéraire.
78. H. Grapow, *Die bildlichen Ausdrücke des Aegyptischen*, Leipzig 1924. Voir p. 168 sous la rubrique: Stab, Stock.
79. On connaît d'autres exemples de la métaphore appliquée à l'anatomie. Les Egyptiens ne désignaient-ils pas, dans le langage courant, la cage thoracique par le mot *ḥn* = coffre? (Cf. «le coffre du corps» dans Amenemope 3, 13; «ton cœur est dans son coffre», dans Belegstellen du W. B. II, 492, 2). De même les omoplates sont désignées – médicalement – par le mot *mḥ'ḳ.t* signifiant «rasoir», instrument qui rappelle leur forme. Un rasoir sert d'ailleurs souvent – au pap. Smith – de déterminatif à *mꜣ'ḳ.t*, autre terme pour omoplate. On pense même que les deux os ont été appelés métaphoriquement *bꜣḳ*, «faucons» (cf. A. H. Gardiner, *Hieratic Papyri in the British Museum, Third Series, Londres* 1935. Voir pap. Chester Beatty VII, p. 57, avec la note 9, ainsi que Additional Notes, p. 135) en raison de leur topographie, cette région étant celle où viennent s'appliquer les têtes de faucon servant postérieurement de contrepoids au grand collier dit «ousekh».
80. J. Capart, dans le compte rendu de A. Hermann, *Die Stelen der thebanischen Felsgräber der 18. Dynastie. Aegypt. Forsch.* t. 11, 1940, paru dans *Chron. d'Eg.*, nº 32, juillet 1941, p. 239.
81. W. B. III, p. 340, s. litt. B.
82. Pour signifier un individu «squelettique», ne dit-on pas qu'il est maigre comme un «bâton», comme un «échalas»?
83. W. B. III, p. 341, s. litt. C.
84. Songeons au terme «carcasse» ou à celui de «châssis» de la langue verte qui expriment, à peine différemment, la même idée.
85. W. B. III, p. 339, s. litt. A.

86. Maints textes opposent la pérennité du système osseux à la putrescibilité des parties molles. (Cf. Pyr., § 722: une conjuration pour les chairs – *ỉwf* – ne pourrissent pas; Livre des Morts, chap. 154 qui atteste que les chairs se liquéfient, deviennent malodorantes et donnent naissance à des vers, tandis que les os persistent, bien qu'ils puissent se ramollir).
87. A. H. Gardiner (in W. M. F. Petrie, *op. cit.* (note 70), p. 34) n'hésite pas à aller jusque là. Il est vrai qu'il se fondait sur la formule trouvée chez Amenhotep, mais copiée erronément (Voir plus haut p. 12.) Nous supposons que c'est c'est la présence du seul signe *ḥt*-non précédé du mot *mdw* estropié dans la copie -qui pourrait bien avoir poussé l'auteur á traduire – littéralement «bois» – par «bodily frame», charpente corporelle.
88. Catulle, 5.
89. Les Musées du Cinquantenaire conservent notamment, sous le n° E 2224, un petit cercueil rectangulaire contenant une ébauche de figurine en bois du commencement du Nouvel Empire et, sous le n° E 4425, un cercueil momiforme (26 cm.) contenant un oushebti de bois de 22,5 cm. (XVIIIe dynastie).
90. Voir notamment A. Wiedemann, *Herodots zweites Buch*, Leipzig 1890, p. 331: «Das in Aegypten verwendete Bildniss war ... aber auch kein Mumienbild, denn vor der Darstellung einer solchen in ihrer wahren Gestalt scheint im Nilthale eine grosse Scheu obgewaltet zu haben».
91. Hérodote, II. 86.
92. Voici d'après Ph.-E. Legrand *op. cit.* (note 5) la traduction du passage entier: «Ces gens, quand on leur apporte un cadavre, montrent à ceux qui le leur ont opporté des modèles de morts en bois, peints au naturel». Chacun de ces maquettes correspondant sans doute à un type bien défini d'embaumement; puisque, une fois les «explications données, ils demandent aux clients suivant quel type ils veulent qu'on leur prépare le corps».
93. L'assimilation opérée vraisemblablement par les Egyptiens entre le corps momifié et le squelette, trouve de curieux échos dans la linguistique grecque et latine. Rappelons d'abord qu'étymologiquement σκελετός signifie «desséché». C'est Galien, qui dans son *De ossibus ad tirones* (Edit. Kühn, t. II, p. 734), transpose ce mot dans le langage anatomique où il lui fait désigner «l'assemblage de tous les os de l'homme tels qu'ils sont reliés entre eux». Galien signale d'ailleurs que quelques auteurs traitant des os ont intitulé leur ouvrage: περὶ σκελετοῦ. Ce qui indique qu'au IIe siècle de notre ère le mot σκελετός était anatomiquement utilisé avec le sens que nous lui accordons. En revanche, en dehors de la littérature médicale, le mot σκελετός servait à désigner uniquement – eu égard sans doute à son sens premier «le corps désséché» et la «momie». Ainsi le dictionnaire Pape donne, outre le sens «désséché», la traduction «momie», mais non celle de «squelette». Sous la forme *sceletus* (masc.) σκελετός passe dans le latin classique. Il y désignera exclusivement la «momie»-jamais «squelette». L'appellation galénique σκελετός = squelette devait d'ail, leurs se perdre pendant tout le Moyen Age pour ne reparaître qu'au XVIe siècle. C'est en effet en 1535 que le *De ossibus ad tirones* de Galien devient pour la première fois accessible en traduction latine, et, avec elle, le concept «squelette».

Ce sera Vésale qui, en dépit de son désir de dresser une nomenclature purement latine, se tournera vers Galien pour lui emprunter le terme σκελετός et l'introduira définitivement dans la terminologie anatomique pour nommer le «squelette».

On en trouvera la mention princeps dans ses «Tabulae anatomicae VI» de 1538. C'est là qu'à la pl. 5 et 6 est imprimé le mot en caractères grecs; tandis qu'à la pl. 4, le squelette vu de face, est encore désigné par l'expression «humani corporis ossa».

Par ailleurs, Vésale n'ignorait pas le sens premier du terme puisqu'il dit (Fabrica I 4–12), «Hanc ... integram ossium mutuo cohaerentium seriem Graeci *σκελετόν*, *quasi assicatum esset cadaver*, nuncuparunt». (Remarquons accessoirement que si dans Galien le «squelette» répond à *σκελετός*, Vésale en fait un neutre *sceleton* (Cf. *Fabrica* I 29–127). Ainsi donc, le corps désséché évoque irrésistiblement le squelette, au point qu'un même terme arrive à exprimer le sens profane «cadavre desséché» et le concept anatomique «squelette».

Si l'on postule pour l'Egypte une superposition identique dans la pensée et le langage, le mot *mdw* pourrait être le terme couvrant les sens géminés de «corps momifié» et de «squelette».

Nous remercions vivement le Pr. J. Steudel de l'Université de Bonn qui a eu l'amabilité de nous communiquer ces renseignements.

THE MEDICAL PROBLEMS OF HENRY VIII*

by

Ove Brinch**

.... it shall be so:
madness in great ones must not unwatch'd go.
Hamlet.

When Henry Tudor won the battle of Bosworth in 1485, he put an end to the wars which had troubled England for more than one hundred and fifty years. A few months later he married Elizabeth of York, in this way uniting the rival dynasties of Lancaster and York. According to canon law they were too closely related to marry, but the Pope granted a dispensation a few days after the wedding had taken place. With the birth of two sons to the royal couple, the danger of the revival of the War of the Roses soon vanished, and England relaxed into a deeply needed state of internal peace.

The first of the Tudor kings was shrewd and calculating. He was able to rule as an absolute monarch, since Parliament had not yet grown so powerful and so opposed to absolutism as under the future Stuart dynasty. Fines, taxes, and "voluntary gifts" made the frugal and avaricious king enormously rich.

His eldest son, the fifteen-year-old Arthur, married the Spanish Princess Catharine of Aragon in 1501. She was rather untalented and no great beauty, but the young lady had a strong will and a violent temperament combined with proud self-esteem and stubbornness. It is doubtful whether the marriage was ever consummated; Arthur was a weakly boy who died a few months after the wedding. The fifteen-year-old widow remained in England, and Henry VII, who was a widower now, wanted to marry

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her, but he soon gave up this plan; it was extremely improbable that the Pope would make an exception from canon law in order to allow a man to marry his own daughter-in-law. A marriage between the younger son Henry and Catharine would not meet with the same difficulties. Canon law forbade a man to marry his sister-in-law, but in such cases the Pope was always willing to grant a dispensation, even if the marriage had been consummated. Pope Julius II was asked for a dispensation, which he granted without delay, and Henry was betrothed to Catharine.

The widowhood of Catharine had been a sad one. Henry VII granted her only small sums of money, and she had to live alone and almost in poverty. In April of 1507, however, a questionable relationship developed with a Spanish confessor, a merry young dissolute Franciscan monk named Diego Fernandez. He had a bad reputation and was a lusty and domineering man of low moral standards. Catharine was much fascinated by him, and he was always with her and exercised great power over her. The Spanish ambassador, in great consternation, reported this to the King in Madrid, but he dared not write how far Catharine's intimacy with Diego had gone; he left it to the King to interrogate the messenger who brought the letter. The relationship was called intimate and extremely scandalous, but Catharine obstinately refused to give Diego up, and he remained in her household for several years until he was convicted of fornication and consequently had to resign from his office.

Henry VII died in April 1509, and Henry VIII mounted the throne of England. A few months later he married twenty-three-year old Catharine of Aragon. Henry was now eighteen years old and a head taller than any of his people, well developed, sound and strong, vigorous and athletic, with reddish brown hair and regular features. He was well educated and could speak English, French and Latin and some Italian. He was very musical and played the lute, organ, and harpsicord, as well as being a skilled composer; some of his psalm melodies are still used in England. He was well read and a lover of the fine arts; he exchanged letters with Erasmus of Rotterdam, who was one of his sincere admirers, and being a pious Catholic he attended mass twice a day and three times on feast days. He was keen on all sports, a clever horseman and a fine wrestler, and he often won the prize at the tilts and jousts held at court. He had a winning and friendly nature; he loved beauty and splendour; he was the richest prince of all Christendom, and all people loved "bluff King Hal". Everything seemed to promise that England would have a splendid future under his rule.

During the first years after his coronation, Henry let the statesmen carry the burdens of government and was himself occupied only with festivals and hunting and his own private life. In the beginning the young couple apparently lived a happy married life, but before the first year was over the first shadows appeared. On January 31, 1510, Catharine was delivered of a still-born daughter. As this took place seven and a half months after their wedding, it appears to have been a premature birth. A few months later Henry was carrying on an amorous flirtation with the married sister of the duke of Buckingham. The latter, stricken with fear, removed the young lady from the court and made her take refuge in a convent, to the great annoyance of Henry. On January 1, 1511, Catharine gave birth to a fully developed boy who was baptized Henry but who died, when only fifty-two days old, of an unknown disease.

In 1512 Henry took part in the war of the Holy League against France and spent the time from June until October, 1513, in northern France. In September Catharine had another miscarriage. In January 1514, three months after his return from France, Henry contracted a skin disease which seems to have lasted almost two months and which caused the King to become greatly interested in the art of medicine. He experimented eagerly with plaster and liniments, which he tried on his friends and on himself. His prescriptions were said to be "verrie goode against sores on the legges and the lykes", and it was especially noted that some of them were useful against the "french disease". This skin disease resulted in his terrible horror of all other maladies and often made him hurry from one place in England to another in order to avoid the plague.

In August 1514 vague rumours were heard that the king desired a divorce. They may have originated because of the three unsuccessful pregnancies of Catharine and the King's grief over lack of a male heir to his throne, and moreover, from his relations with a young woman, named Elizabeth Blount, which he did not try to conceal and which lasted at least five or six years.

The relationship between Henry and Catharine grew worse when she had another miscarriage in November 1514, and in a letter dated 1515 it is said that "the King cares for nothing but girls and hunting". Catharine, however, became pregnant again, and on February 11, 1516, she was delivered of her only viable child, a daughter who was christened Mary and who died at the age of forty-two as the ruling queen of England[1].

In 1519 Elizabeth Blount gave birth to Henry's only extramarital child, a boy who was christened Henry Fitzroy[2]. This made Henry realize that

he could beget a boy with a woman other than Catharine, and the latter began to fear the consequences of this fact. In 1521 it is reported for the first time that Henry had malaria, and later on it is occasionally said that he suffered from similar attacks.

The King's lack of a male heir to the crown had profoundly disturbed the English nobility. The Duke of Buckingham, the greatest and richest nobleman of the realm, had uttered imprudent words concerning his own title to the throne if the King should die without leaving a legitimate male heir, and for this Henry immediately had him imprisoned in the Tower and executed for high treason (1521).

About this time Henry became intimate with Mary Boleyn, a young married gentlewoman who had spent some years at the court of France. Rumour had it that he had also had a similar relationship with her mother, which he denied.

All these years Henry's health seems to have been excellent. As mentioned before, he was an enthusiastic and skilled sportsman, and of course it was inevitable that now and then he was exposed to traumatic lesions. In 1524 it is reported that a lance was broken against his helmet; this does not seem to have resulted in a serious lesion, since he continued the joust without any interruption.

In the following years Catharine's situation became worse and worse. In November 1518 her pregnancies had ended with a still-birth. The King ceased to cohabit with her in 1524, and his growing coolness towards her made her bitter and reserved. When she ceased menstruating two years later at the age of forty-two, she felt lonely and deserted. This feeling was intensified when Henry made his son Henry Fitzroy Duke of Richmond and Somerset. The first of these titles had once belonged to Henry VII, and the second to the father of Henry VII. Catharine feared that her husband would name his illegitimate son as heir apparent.

In the spring of 1527, Henry wanted to betroth his young daughter Mary to the French Dauphin. The Bishop of Tarbes, who headed the French delegation, expressed his doubt of the validity of Henry's marriage. The point was decisive, for if the marriage was not valid the princess must be illegitimate and therefore unworthy of the Dauphin. No doubt this question had already been discussed by the King and Cardinal Wolsey on previous occasions, but this time Henry took it up very seriously. Undoubtedly he was feeling genuine remorse over his unlawful marriage and considered Catharine's many unsuccessful pregnancies as the punishment of God for his guilt. When Catharine learnt this she was,

of course, greatly excited. In June 1527, Henry told her that he felt sure that their marriage was a sacrilege because it was contrary to canon law, and he therefore wanted her to separate herself from him. As Catharine, obstinate and raging, defended herself, Henry became frightened and declared that he did not want to do her any harm, that he only wanted a plain answer to the problem which the Bishop of Tarbes had posed. He did not press the point on this occasion, but a messenger was dispatched to Rome to obtain a divorce from Catharine.

About this time Henry fell in love with Mary Boleyn's sister Anne. Like her sister, Anne Boleyn had spent some years at the French court, and she was now attached to Catharine's household. She had already had some erotic adventures in England, including some with Thomas Wyatt and Henry Percy. She was to marry Percy, but he was ordered to leave the court and renounce Anne, as the King wanted to marry her himself.

In the autumn another messenger was sent to the Pope with a new petition for a divorce from Catharine (1527). In spite of many long negotiations, postponements and counterproposals, Henry never received any answer to his petition. All sorts of arguments were employed; for instance, Henry let the Pope know that he had certain secret motives for divorcing the Queen which could not be confided to a letter, but he hinted that Catharine was "suffering from certain diseases defying all remedy, for which, as well as other reasons, the King would never again live with her as his wife".

During this tug-of-war which lasted several years, Anne had been clever enough to refuse Henry her favour, and the more steadfast she was, the more energetic became Henry's efforts. Cardinal Wolsey was strongly opposed to Henry's plans for marrying Anne, because she belonged to an anticlerical party of the court, and consequently he fell into disgrace and was charged with treason. Among other things, he was accused of giving the King syphilis: "The same Lord Cardinal knowing himself to have the foul and contagious disease of the great pocks, broken out upon him in diverse places of his body, came daily to your grace, rowning in your ear, and blowing upon your most noble grace with his perilous and infective breath, to the marvellous danger of your highness, if God of his infinite goodness had not better provided for your highness". (1529).

An open conflict with the Pope was approaching, and in 1530 Henry revived an old English law according to which the Pope had no executive

power over internal matters in England. Anne was still steadfast, and not until August 1532 did she yield to Henry's lovemaking; by then she felt sure that in a short time she would become Queen of England. In January 1533 they were secretly married; she had just confided to Henry that she was pregnant. Shortly afterwards Henry ordered Parliament to issue a law which prohibited all appeal to the Pope and declared Henry the supreme head of the Church of England. Archbishop Cranmer, the primate of this Church, declared Henry's marriage with Catharine null and void. Parliament decided also that all incomes of the Church should fall to the King. Finally a law was passed which made the children of Anne Boleyn alone heirs apparent to the throne; Mary Tudor had to be considered illegitimate.

On September 7, 1533, Anne gave birth to a daughter who was christened Elizabeth[3] and who eventually became Queen of England. Her birth was a bitter disappointment to Henry, who had expected a boy—an undisputed male heir. He soon became tired of Anne and amused himself with other women, among others a certain Margaret Shelton. In her dispair, Anne feigned another pregnancy, but she of course soon had to admit that it was a false hope. Henry had once more been kind to her, but now he immediately turned to other women again and began to think of means of getting rid of her.

In the meantime the changes in the Church of England continued. It was still Catholic, but it was now separated from the authority of the Pope. The monasteries were dissolved and the monks were persecuted; many of them were killed and their rich estates were confiscated by the crown. A great number of Englishmen who would not acknowledge Henry as the head of the Church were tortured and executed, among them the old Bishop Fisher and Sir Thomas More.

Anne did in fact become pregnant again, but she soon had a miscarriage. A third pregnancy ended with a premature birth (January 1536), perhaps because of two psychical shocks: twelve days before the miscarriage the King had an accident in a joust when he fell and was unconscious for two hours, and some days later she surprised him in the company of one of her ladies-in-waiting, the young Jane Seymour.

After Anne's miscarriages, her relations with the King grew worse. He said that he had been seduced into marrying her, that their marriage was due to sorcery, and that now God, as a punishment, denied him the long-wanted male heir. Furthermore, he had fallen in love with Jane Seymour and wanted to marry her. For political reasons he was supported

by the chancellor, Thomas Cromwell, and in an excited interview he ordered Cromwell to find a solution. The chancellor began to "conspirer et fantaisier", and without warning the charges fell upon Anne.

She was accused of having plotted to poison the King. This accusation was not substantiated in the proceedings and was probably pure imagination. She was further charged with adultery with a young musician and four noblemen, one of them her own brother. All the charges were pure nonsense; in one instance she was said to have had a lover one month after the birth of Elizabeth, and another one month after her second miscarriage. The charge against her brother was based upon his having spent some hours alone with her in her room. Henry's marriage with Anne was declared null and void because she had been officially betrothed to Henry Percy before the wedding, a fact which she admitted. Although she denied adultery she and the five accused men were condemned to death and executed in May 1536.

A few days later Henry married Jane Seymour. It would be interesting to know the feelings of this young woman on the day of her marriage. Henry had grown very fat, and he suffered from an ulcer on one of his legs. This ulcer did not generally annoy him, but it caused him severe pain when, on rare occasions, it closed over; it remained uncured till his death. He was a glutton and a hard drinker, and with the passage of time he had become more and more capricious and unreasonable. In contrast, Jane Seymour was a mild and lovely lady who kindly and affectionately took care of Henry's two young daughters. His affection for her did not go very deep: a week after their wedding he met two beautiful young women and expressed his regrets that he had not met them before he married again.

As now both Mary Tudor and Elizabeth, like Henry Fitzroy, were considered illegitimate, the succession was most uncertain. The King therefore ordered his parliament to issue a law of succession which totally deprived the people and its representatives of any say in the matter. The law transferred to Henry absolute power to indicate the person who was to inherit "his imperiall crowne", regardless of sex and descent.

In 1539 Henry proclaimed his "six bloody articles". These meant a retreat towards Catholicism, declaring the transsubstantiation of the wine and bread at the communion table; they further reestablished private masses and secret confessions and ordered the celibacy of the priests. The violation of these articles was punishable by death.

The first months of Henry's third marriage were full of tension. Henry

Fitzroy died at the age of seventeen, presumably from lung tuberculosis (which seems to have occurred previously in the Tudor family). Henry was therefore immensely satisfied when Jane Seymour became pregnant the following winter. In October 1537 she gave birth to a son who later succeeded Henry to the throne as Edward VI[4]. All England mourned when the queen became ill after the rather fatiguing christening ceremony and died twelve days after her delivery (probably from puerperal fever).

Although Henry abhorred Luther and his doctrines, political conditions dictated a rapprochment with the protestant princes of northern Germany, and accordingly Cromwell proposed marriage with a daughter of one of those princes. He showed Henry the portrait of Anne, daughter of the prince of the little duchy of Cleves, and on this basis the marriage was decided. Henry became desperate when he saw her; the twenty-four-year-old girl was plain and angular; she was pock-marked and had a sallow complexion. Nevertheless, the whole case was so far advanced that Henry could not retire, and the wedding took place in January 1540.

Decidedly this fourth marriage was not happy. Anne roused the greatest disgust in Henry; he declared that she had cohabited with other men before the wedding, and he refused to live with her. A few months later the English bishops declared the marriage to be void on the grounds that she had previously been betrothed to another prince and that this betrothal had not been officially nullified; therefore, according to canon law, Henry's marriage with her had never been valid. It was true that at the wedding Henry had sworn to love her until death separated them, but he now declared that only his tongue had sworn, that his heart had not been in the oath, which consequently was invalid. Whereupon Anne went into retirement, with great relief and an abundant pension.

During the preceding months Henry had fallen in love with one of Anne's ladies-in-waiting, Katharyn Howard, who was a lively, flirtatious and sweet girl of seventeen. They married in August 1540, one month after the divorce from Anne. What this slender young lady saw in Henry it is difficult to understand. He was now forty-two years old, fat and overfed, with small wicked eyes in a round face and a festering ulcer on his leg, whimsical, domineering, egotistical and irascible. More than ever he persecuted everybody who did not comply with his "six bloody articles" or who would not swear to his supremacy over the Church of England. The people groaned under the heavy taxes; the full treasury of his father had long been empty, and his court and wars required enormous sums of money.

The religious persecutions knew no bounds. Protestants, catholics, and anabaptists were burned at the stake side by side, while noblemen and commoners alike were executed by the hundreds if they refused to recognize Henry as head of the Church. In May 1541 a riot broke out in Yorkshire; before Henry left London with his army he summarily ordered all prisoners in the Tower to be executed. There were three at the time, and they had all been imprisoned because they denied his Church supremacy: the old countess of Salisbury, who was the last of the Plantagenet dynasty and mother of the pretender of the York dynasty, de la Pole, and also Lord Leonard Gray and Lord Dacre. For the sake of appearances a charge of murder was invented against Lord Dacre, and all three were executed without trial.

For political and religious reasons the King's counsellors were opposed to Katharyn Howard and wanted to get rid of her. In November 1541 they told Henry that they had discovered she had been living with other men before she married him, a fact which she had not told him. In the proceedings against her it was disclosed that she had also met her cousin, Mr. Culpepper, in private after the wedding. While the proceedings were in progress, Henry had periods of quiet and restraint alternating with violent fits of rage during which he called for a sword that he might put Katharyn to death himself. She and all persons implicated with her were executed in February 1542.

Henry was soon looking for another wife. In January 1543 Lord Latimer died and left Catherine Parr a widow (she was now a widow for the second time, so nobody could reasonably expect her to be a virgin). She was thirty years of age, beautiful, gentle and mild, and possessed of much human understanding; her moral standards were pure and unsullied. Soon after Lord Latimer's death Henry resolved to marry her, and their wedding took place privately six months later.

Henry was now shapelessly obese; "the King was so fat that such a man has never been seen, three of the biggest men that could be found could get inside his doublet". He was still more capricious, preposterous and testy than ever, and the ulcer on his leg remained unchanged. His religious persecutions had killed his popularity long before, and although he had acquired enormous riches by confiscating the monastic estates he was always in need of money.

In her married life with Henry, Catherine Parr displayed all her understanding of the human mind. She was kind to his three children, who in turn also loved her. In her letters to Henry and in her conversa-

tions with him she flattered the vainglorious man, and she always spoke well of him when talking with others. She herself was modest and kind, tractable and tactful.

In spite of his bad health, Henry was at this time waging war with France and Scotland. This war was a rather strange enterprise. According to plan, Henry was first to help the Emperor in France, and then, when Francis I had been defeated, the Emperor was supposed to support Henry in his efforts to force the Scottish lords to accept the marriage of the infant Mary Stuart with Prince Edward of Wales. It is strange that Henry could not foresee what would happen. When the Emperor had obtained what he wanted in France with Henry's support, he made a separate peace with Francis I and left Henry alone. For this reason Henry was forced to abandon the war with Scotland.

Although the relationship between Henry and Catherine was excellent, rumours in the spring of 1546 told of another impending royal divorce. At court and among the King's advisers there were two parties. One tended towards protestantism and included the Queen and the Archbishop, and the other, led by Stephen Gardiner, the Lord Chancellor, inclined towards catholicism. The near death of the King was expected, and both parties tried to obtain ascendancy before he died. The physical weakness of the King was characterized by his extreme obesity, the ulcer on his leg, and certain recurrent attacks which cannot be exactly described. In the intervals between these attacks he could be reasonable and clear-headed, but at other times he had violent paroxysms of rage, apparently over trifles. Finally he could walk only with such difficulty that he had to be transported in a sedan chair or in a "device" which is supposed to have been worked with block and tackle.

Henry loved discussions, especially of religious problems, and once the catholic party, represented by Gardiner, made use of this to attack the Queen. On a certain occasion Gardiner led Catherine into a discussion of protestantism. For once her carefulness and tact failed her when she spoke in favour of the protestant doctrine, and when she had gone Henry got one of his paroxysms. On the spot Gardiner put down an indictment against her with orders to arrest her and carry her to Tower, and, foaming with rage, Henry signed the document. As this was told Catherine she was deeply distressed; she collapsed in tears and nearly gave up all hope. The following day Henry heard of her despair; overnight he himself had completely forgotten the incident, and with great difficulty he went to her room, consoled her with kind words and soothed her before he returned to his bed.

A little later Catherine went to his room, accompanied by a lady-in-waiting. He received her kindly and as usual began to discuss religious questions with her. But by now Catherine was wise enough not to enter into a discussion, and declared that women did not understand such intricate problems which it required a man's sagacity to solve, and that now as always she was convinced that the King, being the wisest of all men, was completely right in his opinion. But the King declared that she was as learned as any doctor and was well able to instruct him as she had done before. Catherine answered that when she on previous occasions had mentioned religious questions it had only been meant as a pastime for him and for the purpose of being instructed by his learned words—for which the King praised her and told her of his joy in their good friendship.

Later on, as they were sitting in the garden and talking merrily with each other, the chancellor arrived with the guard to arrest Catherine. When it dawned upon the King what he had come for, he abused Gardiner with terrible invectives and ordered the perturbed chancellor to be off with his soldiers. He suddenly remembered signing the order for the Queen's arrest, which he had completely forgotten, and this gave him another violent fit of rage. Later in September Henry had another "attack". Although he was in bed for a long time and everybody thought that he would die, he recovered as he had after the previous attacks.

However, at the end of December, Henry had another "attack" and it was evident that he was approaching death. His forgetfulness increased, as was demonstrated by his written orders to respect the French fortifications of Boulogne which were issued simultaneously with his oral orders to demolish them. He dictated his last will, the contents of which were the result of wise forethought: successors to the throne were to be Edward and his children, then Mary Tudor and her children, and finally Elizabeth and her children. He declared himself a good catholic and ordered requiem masses to be held in case there should be a purgatory. The regency which was to rule during the minority of Edward was to include men of both the protestant and the catholic court parties.

In spite of his weakness he intervened with great energy when the Earl of Surrey and his father Norfolk conspired against the succession. Surrey had planned to arrest the Prince of Wales after Henry's death and mount the throne of England himself. Henry immediately ordered him to be imprisoned in the Tower, where he pleaded guilty. According to the King's sentence of death he was beheaded on Tower Hill January 19, 1547. Norfolk too admitted his guilt but asked for grace. Henry was

now so weak that he could not comprehend anything. The chancellor maintained that Henry had ordered Norfolk to be executed on January 28, and in the name of the King he signed the death sentence.

Until the middle of January, Henry had been carried to the council chamber where he received foreign ambassadors, and periodically he seems to have been quite sensible. But the last eight days of his life he spent in bed, unable to move his legs or to carry a glass of wine to his lips. In the afternoon of January 27, 1547, he became unconscious, and in the evening he died. The constable of the Tower refused to carry out the death sentence of Norfolk, which was not signed by the King himself. Thus the death of the King saved Norfolk's life.

We have previously listed, in so far as it was possible, all of Henry VIII.s physical and mental symptoms of disease[5] and deviations from the normal. An attempt will now be made to summarize and examine these symptoms in order to procure a clear picture of his diseases and mental peculiarities.

A number of different theories of the diseases of Henry and of his family have been set forth. In 1888 the obstetrician *Currie* was the first to suggest that Henry suffered from Syphilis and that this was why Catharine of Aragon had her miscarriages and still-births. This was written at a time when it was still maintained that a sound woman could bear syphilitic children, and Currie did not think that Catharine herself had had syphilis.

In the 1920's the gynecologist *MacLaurin*, apparently without knowing Currie's article, was of the opinion that Henry had had syphilis. He founded this theory on Catharine's miscarriages and still-births, the bad health of most of Henry's children, the ulcer on his leg, his "terrible mental, moral and physical degeneration" during the last seventeen years of his life, and his comparatively early death in stupor.

The English psychologist *Flügel* in 1920 published a psychoanalysis of Henry VIII. He states that Henry was influenced by an Oedipus complex and refers to the many instances where he was surrounded by incest (canonically). He states the opinion that the King was partly attracted, partly repelled by incest, and that although he demanded chastity and fidelity in his wives, he was, nevertheless, stimulated by the idea of their relations with other men. This article was written in the infancy of psychoanalysis, and Flügel's theories cannot be maintained in the light of modern critical opinion.

The surgeon *Kemble*, writing in 1931, is of the opinion that Henry

had syphilis, but offers no scientific documentation. According to Kemble, Henry's ulcer had started with a gummatous ostitis with perforation to the marrow cavity, and eventually resulted in a common osteomyelitis by secondary infection with pyogenic cocci.

In 1932 the historian *Chamberlin* wrote a book in which he carefully noted from contemporary letters and documents everything that, according to his conception, could be considered as indicating ailments and recoveries in Henry and his queens. These statements he submitted to four physicians, a surgeon, a gynecologist and two obstetricians. They all emphasized the fact that there was nothing to indicate syphilis in the medical history of the royal family.

Appleby, in an article dated 1934, assumes, without offering any proof, that Henry was a syphilitic.

In 1947 *Ellery* proposed the theory that Catharine's unsuccessful pregnancies were due to her being a rhesus-negative woman. This theory cannot be accepted because if it were true, she must have started with a natural birth or two, and continued thereafter with still-births.

MacNalty in 1952 wrote a book on Henry's diseases and was of the opinion that a number of brain concussions, acquired in jousts, were the cause of his eventual mental changes. According to MacNalty, Henry was not a syphilitic.

In the same year, the bacteriologist *Shrewsbury* published an article to defend Henry against the charge of "voluntarily acquiring and knowingly transmitting a dangerous disease (syphilis) that has the most serious implications" to Catharine[6]. The intention of Shrewsbury's article is to prove that Henry was not a syphilitic; in this he certainly has not succeeded.

It must be expressly stated that no specialist in internal diseases, venerology, neurology or psychiatry, has ever pronounced a written opinion of the diseases of Henry VIII, and no iconography and no study of his holograph letters has ever been attempted.

As to the important point of syphilis, the first question to examine must be the possibility of his contracting this disease. From the historical biographies we learn that he was of a rather moderately sexed nature, and that he only had extramarital cohabitations with three women (Elizabeth Blount, Margaret Shelton, and Mary Boleyn), and that he did not cohabit with Anna of Cleves and Catherine Parr. This surprising estimate of Henry's sexual life is based upon the fact that there is no contemporary account of his relations with other women. The contemporary accounts that do exist are principally the reports of foreign

ambassadors to their respective masters (contemporary Englishmen would not venture to write letters on such subjects), and historians without doubt will feel obliged to relate only facts that can be verified. In that case they will easily run the risk of drawing wrong conclusions.

Of course the ambassadors were only interested in Henry's extramarital relations, if there was a chance that they might result in political complications. It was not worth mentioning in their reports when the King had transient relations with casual women. Henry VIII matured early and was a strong, athletic youth with a great appetite for the pleasures of life, and it is extremely improbable that he had his first sexual experience at the age of eighteen when he married Catharine, who was five years his senior. In any case, any indignation about the idea of Henry's possible relations with other women before and after his first marriage is irrelevant.

Just when he was sexually mature the syphilitic infection was ravaging all Europe, and the danger of infection was extremely great, especially in casual relations. Moreover, the primitive hygiene of those days offered copious chances of infection by common use of goblets, etc. (syphilis insons). Consequently, the young prince was very much exposed to syphilitic infection. It is true that no contemporary account has mentioned any early syphilitic infection or any anti-syphilitic treatment, but it must be taken into consideration that a primary syphilitic ulcer in the mouth may have been mistaken for a common angina or a labial herpes. Such mistakes would have been especially possible in cases of syphilis insons; but there are other possibilities of a syphilitic infection.

Henry married Catharine of Aragon in 1509. Two years before she had had a relationship mentioned above, which was called intimate and extremely scandalous, with the immoral and domineering Diego Fernandez. One must consider the possibility that he had given her syphilis by sexual intercourse or syphilis insons. The latter mode of infection was hardly known at that time; knowledge of the ways of infection was rather limited, which appears from the charge against Wolsey as late as 1529 of having tried to infect the King with syphilis by means of "rowning" in his ear.

In the summer of 1513 Henry was making war against Francis I in France. He returned to England in October, and in January 1514 he contracted a skin disease; he was then twenty-three years old. According to one account the King had a fever, and it was feared that it would develop into "such pustules which are called variolae". Another account

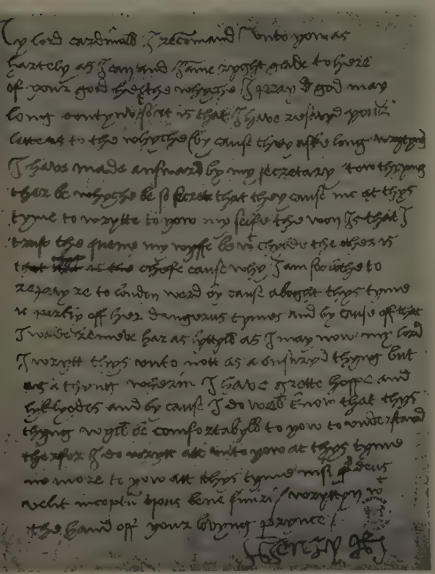
Fig. 1. Painting of Henry VIII by Holbein 1536. Reproduced from Ganz: *The Paintings of Holbein the Younger*, London 1950.

Fig. 2. Replica of a Painting of Henry VIII 1537. (The Collection of Windsor Castle). Reproduced from Ganz: *The Paintings of Holbein the Younger*, London 1950.

Fig. 3. A Chalk Sketch of Henry VIII by Holbein 1540 (the Munich Collection). Reproduced from Shrewsbury: *Henry VIII. A Medical Study* (Journal of the Hist. of Med., Vol. VII Nr. 2, 1952).

Fig. 4. Henry VIII 1544, an Etching by Cornelys Matsys. (Reproduced from Chamberlin: *The Private Character of Henry VIII*, London 1932).

Fig. 5. Henry VIII, enlarged Reproduction of a Miniature in the Personal Psalm Book of the King. (Reproduced from: Chamberlin: *The Private Character of Henry VIII*, London 1932.)



5. Holograph Letter from Henry VIII to Cardinal ey 1518. (Letter No. 1). Reproduced from Pollard: *Henry VIII*, Edinburgh 1902.

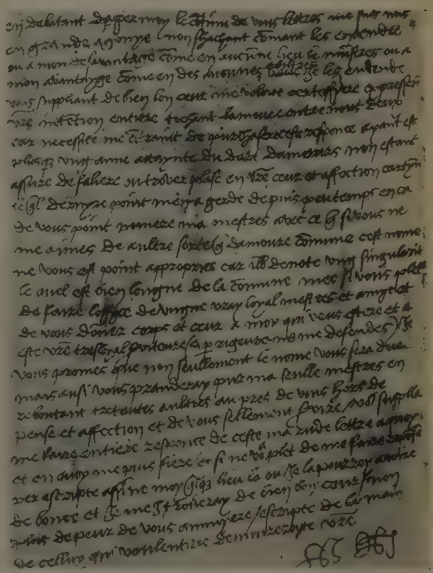


Fig. 7. Holograph Letter from Henry VIII to Anne Boleyn 1527. (Letter No. 2). Reproduced from Pollard: *Henry VIII*, Edinburgh 1902.

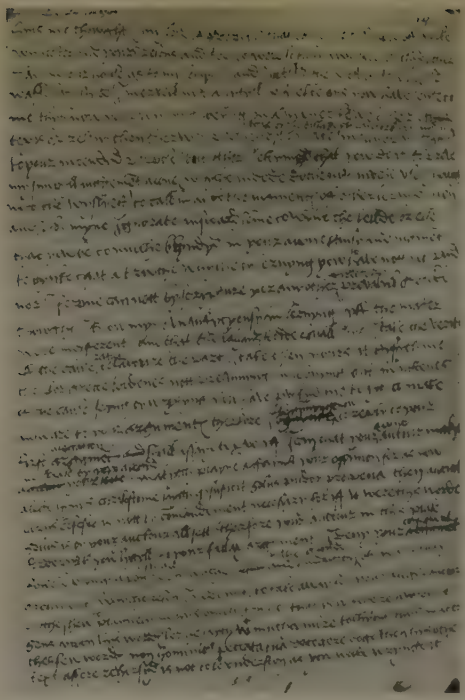


Fig. 8. Holograph Letter from Henry VIII to the Bishop of Durham 1539 (Letter No. 3). Photograph of an original letter preserved in the Cotton Library of the British Museum, London.

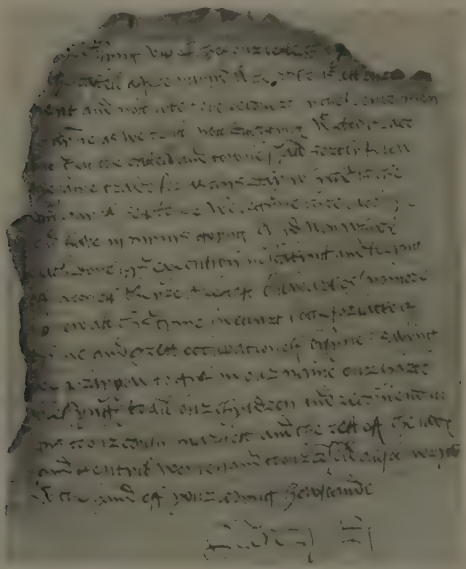


Fig. 9. Holograph Letter from Henry VIII to Catherine Parr 1544 (Letter No. 4). Photograph of an original letter preserved in the Cotton Library of the British Museum, London. The margin of the letter has been damaged by an incendiary.

tells that "the King of England has had a fever; the doctors were afraid of his life, but it ended in small-pox". The Venetian ambassador, however, wrote to the Doge that Henry had measles. Presumably these reports originated directly from court. Nothing is known of the treatment of this disease, which lasted a month or two. In 1529 the new Venetian ambassador, Falieri, in a written report to the Doge gave a thorough description of Henry's external appearance, his education and abilities etc. Falieri emphasizes Henry's face and features, which he describes as being very handsome and beautiful, "like an angel's". He does not mention the face being pock-marked, and no other description of Henry gives any hint of pock-marks.

We may conclude that in January and February of 1514 the King suffered from a disease which involved a skin eruption, the nature of which was not evident to the physicians. It could hardly have been variolae, for an attack of small-pox lasting for two months, would certainly have left well-known marks which are not mentioned later. It might, however, have been a syphilitic skin eruption; that it was not acknowledged as great pocks might be explained by the probable fact that doctors, only twenty years after the beginning of the great epidemic, could hardly have been familiar with the various skin eruptions which follow in the wake of that disease. The knowledge of differential diagnosis of skin diseases was very limited; there was no differentiation, for instance, between measles and scarlatina, and it seems probable that doctors did not differentiate sharply between varicellae and variolae.

In March 1537 Lord Montague was put on trial and said: "... I dreamed that the King was dead, but one day he will die suddenly; his leg will kill him, and then we will have jolly stirring". This seems to be the first time that Henry's leg ulcer is mentioned. Montague's expression "his leg will kill him" tends to show that the fact was well known, since it is not described further. The ulcer must have existed for a certain length of time, perhaps several months. Furthermore, Montague must have considered it a severe disease, since he thought that Henry might die from it.

Only a little is known of this ailment. Contemporary accounts call it an ulcer, a sinus and a fistula, but nothing is said of the localization on the leg. It remained unhealed until his death, but it is repeatedly mentioned that on several occasions when the fistula was closed, Henry suffered severe pain until the ulcer opened again.

Shrewsbury maintains that the ulcer was due to uric arthritis of the knee joint. This diagnosis is based on the fact that Henry VII suffered from "gout", and on the gluttony and drinking habits of Henry VIII. The foundation for this diagnosis is rather slim and must be compared with the statement of the Spanish ambassador Chapuis: "Henry's malady was only by chance and has no certain return like the gout, the proper season of which is the autumn". It seems that the "gout" of the days of Henry VIII cannot be identical with the same ailment of modern terminology. The supposition of Shrewsbury that the fistula might originate from a common staphylococci infection, which he thinks was a widespread disease of those days, must be considered pure conjecture.

The ulcer may well have started as a syphilitic gumma which, as Kemble thinks, had penetrated to the marrow cavity and caused a secondary streptococci osteomyelitis with permanent secretion, giving the patient violent pains when the fistula was closed for one reason or another. In 1538 it is reported that the King "has had stopped one of the fistulas on the leg, and for ten or twelve days the humours which had no outlet were like to have stiffled him, so that he was sometime without speaking, black in the face and in great danger, but now the King is so well again as nobody had dared to hope". This seems to indicate that a therapeutic attempt to close the fistula had been successful and caused a retention of the "humours" in the marrow cavity until the outlet had been reestablished. The ulcer cannot be supposed to originate from varicose veins, because the healing of a varicose ulcer is not painful, but rather quite the contrary.

It is reported that in 1546 Henry was not able to walk any more, but had to be transported in a "device" which is supposed to have been a sort of elevator with block and tackle; it may have perhaps been only the sedan chair, which is mentioned in the inventory of the castle. Both interpretations may be right: he may have been carried from one room to another and hoisted or lowered from one storey to another. At that time he was enormously fat, but apparently his walking difficulties were due to the weakness of his legs. In this connection one must of course think of tabes dorsalis, and furthermore of the paintings which represent the King standing with straddled legs. He may have chosen this position because it gives good support to ataxic legs, but it might just as well be what ethologists call an "imposing attitude".

When contemplating this question, it is of great interest to compare various contemporary pictures of Henry VIII. Holbein has painted

several portraits of the King which are of some significance in this connection. The first is from 1536 and shows the King in three-quarters view with the right side of the face turned towards the observer (Fig. 1); it is remarkable that the nose of this portrait is quite normal. All later portraits are facing to the front; most of them are supposed to be contemporary replicas of an original which no longer exists. On one of these copies (1537) which belongs to the collection of Windsor Castle (Fig. 2) a deformity of the nose is distinctly noticeable as a slight circumscript swelling about the form and size of an almond, reaching from the lower part of the nasal bone to the wing of the nose. In 1540 Holbein made a chalk sketch of Henry's face (Fig. 3), and in the place of the swelling a corresponding circumscript depression of about the same size is distinctly visible on the sketch. On a portrait of Henry in the National Gallery in Rome, which Holbein is supposed to have painted in 1539–40, neither a swelling nor a depression is seen on the nose.

But in 1544 Cornelys Matsys made an etching of Henry which deviates greatly from all other portraits. In this etching he is depicted with an oblique glance in the small, screwed-up wicked eyes and cruel lines around the mouth, The extremely repulsive face is flat and fat, and on the right side of the nose the depression is shown (Fig. 4). It is the size of a nut. Size and localization are unchanged but there is now in addition a marked deviation of the nasal septum which is specially remarkable between the nostrils.

In the personal psalm book of Henry an artist has painted or drawn a miniature of him from his last year. He looks now very much aged, weak and furrowed, and his hair and beard are white. It seems that his right eyelid hangs lower than normally, while the left eye appears more open than is natural (Fig. 5). It must, however, be remembered that the original is a miniature and one must not attach too great importance to details of small single strokes of the artist's brush or pencil.

The deformity of the nose is of great importance. It cannot be ascribed to a traumatic lesion, in the first place because this generally deforms the nasal bone, which is not altered in Henry's case; secondly because a post-traumatic swelling will soon vanish and the result of the lesion will then remain stationary. A deformity that begins with a swelling and ends with a depression can, practically speaking, only be caused by an inflammatory subcutaneous process and a consequent cicatricial shrinkage of the soft tissues. Such a process is characteristic of a syphilitic gumma. It must presumably have begun some time before 1537, when it was

depicted for the first time; it may even have started in the last months of 1536. In that case it would have appeared simultaneously with Henry's leg ulcer, and this fact strongly supports the supposition that the ulcer was of syphilitic gummatous origin. Some contemporary reports suggest that Henry had ulcers on both legs; if these reports are reliable this would give a still stronger support to the diagnosis gummata multipla.

The absence of the deformity of the nose on the Rome portrait, on the wedding portrait from 1539–40, and on the well-known painting of the barber-surgeons' guild (1542–43) is easily explained. Presumably Henry ordered the artist to leave the deformity out; on the portraits which would remind coming generations of "the King's Majesty" he wished to appear as favourably as possible. In order to increase the majestic effect, his clothes have been given quite unnaturally broad shoulders, and his hands and feet and the straddling legs have assumed a carriage which is highly imposing. This carriage corresponds to what ethologists call imposing attitude in animals, and therefore the straddling legs do not necessarily indicate ataxy.

Generally speaking the observer gets the impression that the paintings of Henry VIII tend to beautify and idealize the King, while drawings and etchings seem to be more realistic than the painted portraits. Presumably Henry never saw the etching by Cornelys Matsys; if he had, he certainly would have had the plate destroyed. As to the miniature portrait two things should be remembered: it is a three-quarters view, but it is the left side of the face which is turned towards the observer; Henry has taken care not to show the ugly side of his nose. And moreover the miniature was painted in his personal psalm book where it would be concealed from other people.

Nothing is known of Henry's walk, nor of his voice, speech, sight or hearing. In the biography by Pollard (1902) two holograph letters are reproduced in facsimile, one from 1518 and the other from 1527. The present writer has had two additional holograph letters photographed, the originals of which are preserved in the Cotton Library of the British Museum; one dates from 1539, the other from 1544.

On comparing these four letters it is seen that No. 1 and No. 4 are easily legible and the contents easily understood in spite of an almost complete absence of punctuation; the sentences are sensibly constructed and tolerably clearly formed. No. 2 and No. 3 are quite different; their handwriting is crabbed and the words are repeatedly struck out and corrected. No. 2 is a love letter to Anne Boleyn, written in French and

with an almost incomprehensible sentence construction. Only by means of suitable punctuation and much imagination can one discover that the letter contains a reproach to Anne Boleyn because she would not become his mistress, and an entreaty for an answer as soon as possible. No. 3 is a very learned theological interpretation of a sentence of S. Chrysostomus which Henry considers in favour of the timeliness of the special sort of confession which he had ordered. This letter, like No. 2, has a number of corrections but no punctuation at all, and the sentences are formed so obscurely that their intent is almost incomprehensible. If an observer had only this letter (from 1539) he would rightly conclude that the writer must have suffered from a disease of the central nervous system (in this case the so-called third stage of syphilis). However, on comparing this letter with No. 2 (from 1527), one must admit that the one is just as disorderly and incoherent as the other. Considering that letter No. 4 from 1544 is just as clear and easily understood as No. 1 from 1518, it cannot be assumed that the writer of these four letters suffered from a syphilitic cerebral disease. The shortcomings of the second and third letters must be due to other reasons, and it is an all but obvious assumption that the writer was under the influence of alcohol when he wrote these two letters; Henry habitually consumed great quantities of wine, beer and gin.

In studying the mental state of Henry VIII one is confronted by great difficulties. Only one fact is commonly agreed upon: in about his 40th year an alteration in his character sets in; this does not begin suddenly but leads eventually to progressive deterioration during the last 17 years of his life. However, this alteration of character is differently interpreted by different historians and by the physicians who have studied his case.

As a prince and as a young king, Henry was highly intellectual, talented, cultured and well educated; he was friendly and sociable, beloved and a great favourite with everybody, a Prince Charming and an elegant man of the world. In the course of the last 17 years of his life he changed into an ugly, obese tyrant deprived of all popularity, who recklessly and with horrible cruelty terrorized his people, respecting no one, with the sole purpose of increasing and consolidating his power.

During the first 20 years of his reign Henry was politically shrewd and cunning. In the great political struggle on the Continent he knew how to stake his little English kingdom to the best advantage, thereby being able to change the great political balance of power as he willed by supporting now one group of states, now another. In England itself conditions were

quiet, orderly and peaceful. The first sign of anxiety and lack of mental balance occurred in 1521, when Henry had Buckingham executed for aspiring to the throne. Six years later he began to consider a divorce from Catharine because his marriage with her was contrary to canon law. It must be emphasized that he petitioned the Pope for the divorce *before* he fell in love with Anne Boleyn, and consequently his pangs of conscience were probably sincere.

The alteration in his character and mental faculties began at the time when he wanted to marry Anne Boleyn. He then committed one of a number of seemingly irrational actions. In the autumn of 1527, when he was 36 years old, he despatched a messenger to Rome with two petitions. First of all the Pope was asked for a declaration that his predecessor had had no power to exempt from the provisions of canon law the prohibition against marriage between a man and his brother's widow. Secondly the Pope was asked for an exemption from the same canon law's prohibition against a man's sexual relations with two sisters (Mary and Anne Boleyn). These petitions of course only entangled matters even more; they were too much even for the very amenable Pope, who in addition was not free because of his dependence on the Emperor, who was Catharine's nephew and who was keeping the Pope imprisoned in Castel San Angelo.

Henry committed his next irrational action in the case against Anne Boleyn (1536). She was accused of adultery, and Henry made the archbishop declare the marriage null and void. Consequently the charge of adultery ought to have been dropped, but nevertheless she was sentenced for this crime (and for having attempted to poison the King, a charge which seems to have been pure nonsense). Henry's intention of declaring the marriage invalid is supposed to have been inspired by his desire to have Elizabeth, like Mary Tudor, considered illegitimate, thereby excluding her from the succession. This explanation, however, cannot be accepted, as no woman up to that time had been crowned as a ruling queen of England.

Henry's action during the trial of Katharyn Howard was equally irrational. Katharyn was accused of having known other men before her marriage with Henry, and the trials made it evident that she had also had secret meetings with Mr. Culpepper after the marriage. This, however, was not included in the charge; presumably Henry did not wish to be declared a cuckold a second time. Consequently the whole charge was based on a foundation so weak that Parliament, in other cases always compliant, hesitated to sentence Katharyn. As a matter of fact, she was

only charged with having tainted Henry's Blood-Royal by her premarital relations with other men. As the trial dragged on, Henry constructed an additional charge of treason, and Parliament did not dare to hesitate any longer; no evidence was demanded, and Katharyn was sentenced to death.

Patients suffering from cerebral syphilis generally are very extravagant and absurd in financial matters and in the management of their affairs; they display signs of megalomania and are inclined to forget important actions a short time after they have committed them. Eventually they become slack and apathetic (dementia paralytica). The extravagance of Henry VIII is not easily estimated. It was part of his royal dignity to wear silk and velvet, to adorn himself with gold and precious stones and to scatter about him costly presents of ready money, fine jewellery and rich estates. In his youth he was the richest monarch of all the world, and after the reformation he confiscated almost 800 monasteries along with their estates and riches. While in this regard his covetousness knew no bounds, he was hardly more extravagant than other kings of his time and for several centuries to come. His extravagance perhaps was a reaction against his father's wellknown economy, and, in any case, cannot be attributed to cerebral syphilis.

The question of his megalomania is equally difficult to answer. Considering such background factors as Henry's age and his power as an absolute King, it must be presumed that his megalomania would assume expressions rather different from those of a common person of today. A megalomaniacal King of the period probably would have believed that he was Emperor, Pope, or God himself. No one else could have been his superior. The words "empire" and "imperial" are frequently employed in contemporary documents. Henry's greatest man-o'-war was christened "Harry Imperial", his throne was called his "Imperial See", and he speaks of his "imperial crown". He wanted to unite Ireland and Scotland with England and to realize his right of inheritance to France, so creating an Empire which might come up to that of Charles V. But this cannot be considered megalomania; it is nothing but a violent craving for power.

Moreover, there is a linguistic explanation of the matter. Contemporary statesmen expressly defined the word "imperial" as being identical with the modern words "independent" and "sovereign". In Law No. 24 of the Parliament session of 1532, for instance, it is pronounced: "This realm of England is an Impire ... gouerned by one suppreme head and kynge, hauing the dignitie and royall estate of thimperiall crowne of the same".

In the conflict with the Pope, however, the case was different. When the Pope would not grant a divorce from Catherine, and since he wanted to marry Anne Boleyn, Henry could see no other way out than to detach England from papal authority. At the same time he made Parliament declare him supreme head of the Church of England with all the power of the Pope and entitled to all the riches and incomes which had previously belonged to the Pope. He boasted that he was King, Emperor and Pope all in one person. A comparison with Luther is natural: Luther detached Northern Germany from the authority of the Pope, but he did not himself aspire to the supremacy of the Protestant Church with the position of a Pope.

Henry, on the other hand, enforced his spiritual supremacy with terrible cruelty. Priests, monks and laymen, protestants, catholics and anabaptists were hanged and burned at the stake by the hundreds, only because they would not recognize him as the head of their Church. In comparison with the atrocities of the Spanish Inquisition and the burning of heretics in France an obvious fundamental difference will appear. Neither in Spain nor in France were the heretics killed by the rulers for their own glorification, but *ad majorem dei gloriam* and because they would not belong to the Catholic Church and recognize the Pope as their spiritual lord. In England Henry VIII ordered people of all confessions to be executed because they would not recognize himself as the head of the Church, as their Pope. Certainly this cannot be considered megalomania. Patients with dementia paralytica fancy that they are something very great, which they are not in reality. But Henry did not fancy that he was Pope; he decreed himself Head of the English Church, decreed himself its Pope, just as he tried to create an empire. In both cases his actions resulted from a violent craving for power.

The question of Henry's relations with the Church leads directly to the question of his relations with God. In certain periods he adhered to catholicism, acknowledging his own self as the Pope of England; at other times he swung towards protestantism. One must not attach too much importance to these shifting beliefs; they were the result of political ambitions as in the case of many other princes. The principal basis of his religion was always catholic, but independent of Rome, a position which was violently maintained in the six bloody articles of 1539 in which he gave sovereign orders as to religious worship.

In December 1545 Henry made his last address to Parliament. This address, which has been called his political testament, is generally dealt

with very emotionally by his biographers. This is rather surprising, since the text is a tissue of self-glorification, hypocrisy, unction and boasting. He emphasizes his love and goodness to his people and his subjects' confidence in and affection for himself; he reproaches them for their ardent discussion of the question as to which creed or which learning was right. He is moved to tears and weeps openly as he humbles himself before the face of God; he mentions his small and poor faculties, but towards the end of the address he asserts himself when he calls himself "your supreme head and sovereign Lord". He reproaches his people with their lack of fraternal love and brotherhood and tells them to love each other and not to quarrel over God and religious problems in alehouses and taverns. If anybody is of opinion that a priest or a bishop does not preach the right learning he ought not to quarrel over it but to report the case to the king's councillors "or to us, to whom is committed by God the high authority to reform such causes and behaviours". And he ends by repeating his sermon on brotherly love.

This address repells the reader, not only because one can almost smell the gin on his breath, but also, and not least, because of the background of Henry's own egotism and lack of altruism, his brutality and despotism, and his repeated shifts from orthodox catholicism towards his private English catholicism, over the boundaries of protestantism and back again to English catholicism. What Englishman could feel certain which creed he ought to embrace in order to be in harmony with the supreme head of the Church? Without doubt Henry considered himself the specially appointed deputy of God in spiritual and worldly affairs, and Luther may have hit the mark when he said: "Der Junker Heinz glaubt, er ist Gott und kann alles machen". On this point one may perhaps consider his opinions and actions expressive of megalomania.

As mentioned above, patients with cerebral syphilis are inclined to forget important actions a short time after they have committed them. In Henry's case there are certain such episodes, as for example when he in a violent fit of rage, signed an order for the arrest of Catherine Parr on a charge of heresy, and immediately proceeded to forget it until the following day when the chancellor came to arrest her and was turned out in another fit of rage. Another instance of his forgetfulness in his last years is seen in his written orders to tear down the French forts around Boulogne, which were issued simultaneously with his verbal orders to leave them untouched.

An attempt to trace the character of Henry VIII during the last seven-

teen years of his life demonstrates that he, in the first place, is recklessly egotistical. Every personal consideration is put aside in favour of his selfishness; even his queens and his daughters are not spared. He demands unconditional surrender and obedience from everybody irrespective of rank and station in life. Anyone who will not swear to recognize his spiritual and temporal supremacy, or who otherwise violate his six bloody articles, is subjected to the most terrible torture and executed in the most horrible way in order to satisfy his craving for self-glorification.

It has been said of Henry that he never broke the law. This may be true, but it is explained by the fact that he controlled elections to Parliament and compelled it to issue such laws as he demanded. From 1511 until 1529 no Parliamentary elections took place. Generally Parliamentary sessions lasted only a few weeks. It is true that the nature and the functions of the Parliament of the XVI. century cannot be paralleled to those of our time. But it must be remembered that Parliament never even tried to oppose Henry. When it at rare intervals refused to obey the King's orders, it was always on the matter of the imposition of taxes. In other respects Parliament was very obedient; it did not even scruple to issue penal codes with retroactive effect when Henry ordered it to do so. At last, however, even the most obedient Parliament became too troublesome, and in 1539 Henry made it issue a decree which gave his proclamations the validity of law.

Henry, like most other perpetrators of violence, was always a coward. It is true that he was bold enough in tilts and jousts, but in his wars he never personally took part in battle. In addition, he was also a psychical coward. When he wanted to divorce Catharine and on some occasions was met with her stiff resistance, he kept himself in the background and made his statesmen act in his place. Later on, when he wanted to part with his other queens and his statesmen, he always made others act on his behalf in order to avoid personal annoyance.

His egotism was strongly evident in his craving for power and his desire to appear in a favourable light to other people, in his appearance and manners as well as in ethical respects. That is why he ordered Wolsey to invent the crimes with which Anne Boleyn was charged; that is why he did not charge Katharyn Howard with adultery, and that is why he ordered Holbein and other artists to make replicas of an old portrait, which demonstrated "the King's Majesty", at the expense of true likeness.

As a result of the foregoing examination of Henry VIII.'s diseases and deviations from the normal, the symptoms to be considered in arriving at a diagnosis of the King may be summarized as follows:

1) At the age of twenty-two and four years after his marriage with Catharine of Aragon, he had a skin disease which could hardly have been small-pox.

2) At the age of thirty-three he had his first attack of malaria.

3) At the age of thirty-seven he began to suffer from severe headaches which returned at varying intervals throughout his life.

4) During the last seventeen years of his life he was increasingly obese.

5) From about his forty-fourth year he suffered from an ulcer on one leg (or on both legs) which was never permanently healed and which was not painful except when the fistula, at varying intervals, was temporarily closed.

6) At the age of forty-four or forty-five he acquired a deformity of the right side of the nose, at first consisting of a circumscript swelling, eventually resulting in a corresponding depression, located in the region between the lower end of the nasal bone and the wing of the nose, and causing a deviation of the nasal septum.

7) The last half or whole year of his life he could not (or could only with great difficulty) walk and had to be transported from one place to another. From 1535 he is depicted with his legs astride.

8) The last months before his death he had a number of "attacks" which are not described in detail, and between these he had periodical violent paroxysms of rage.

9) His character and psychic appearance during the last seventeen years of his life underwent a remarkable alteration, which set in a few years before his leg ulcer is first mentioned and his nose deformity is first observed.

10) The psychic alteration shows an increasing egotism, self-glorification and absence of inhibition in his personal affairs.

11) On certain occasions during his last year he totally forgot important dispositions shortly after he had made them.

12) In 1518 as well as in 1544 he was able to write letters of high quality, sensibly constructed and easily understood. Between these dates his letters could be incoherent, irrational and almost unintelligible.

13) Finally, the miscarriages and still-births of Catharine of Aragon must be taken into consideration.

All these are indisputable facts. As to their interpretation one must admit that most of them, taken one by one, do not prove a syphilitic infection; his leg ulcer may have been a common osteomyelitis, the skin disease in 1514 may have been a furunculosis; his egotism and craving for power, his recklessness and cruelty, may have been expressive of psychopathy; his difficulty in walking may have been caused by prolonged alcoholism; the straddled legs in the paintings may correspond to the imposing attitude of animals; his supposed ptosis of the eyelid may have been an unintentional stroke of the miniaturist's brush with no foundation in reality; his "attacks" may have been minor cerebral haemorrhages; his paroxysms of rage may have been due to arteriosclerosis of the cerebral arteries; his forgetfulness may have resulted from alcoholic intoxication, and Catharine's unsuccessful pregnancies may have been due to habitual miscarriages.

It should be noted that eleven of these symptoms are only based on second-hand evidence, derived from contemporary reports made by people without medical knowledge and experience. There are two first-hand pieces of evidence which will bear objective examination: the portraits of Henry VIII and his holograph letters. As to the portraits it must be admitted that if the deformity of the nose can be recognized as a gumma, the diagnosis is evident, of course, at once; as a matter of fact, it can hardly be interpreted in any other way; it will furthermore be seen that several other symptoms might without difficulty fit the picture: his leg ulcer (or ulcers), his head-ache, his skin disease, the ptosis of the eyelid, Catharine's miscarriages and—perhaps— a hint of megalomania.

In the complex of symptoms one has of course no clinical or laboratory examinations to go on. No examination has been made of Henry's skeleton which would confirm or dismiss the diagnosis of syphilis with absolute certainty. In favour of the diagnosis of juvenile syphilis the age must first of all be considered. It was a period in which the new infectious disease was extremely widespread, in which its character as a venereal disease had hardly been generally understood, in which the secondary and tertiary symptoms, especially the skin eruptions and the gumma, had hardly been attributed to syphilis, and in which extragenital primary syphilis had scarcely been recognized. It must furthermore be remembered that although syphilis was from the beginning treated with mercury, this treatment was so ineffective that the infectious skin eruptions might reappear many times. The sources of infection were so numerous that the early developed, virile and vital young man with an abounding appetite

for the pleasures of life must have been highly exposed to syphilitic infection.

There is nothing to indicate definitely that Henry had tabes dorsalis or dementia paralytica. (If he had syphilis he may have escaped medullar and cerebral complications, like most other syphilitics). His holograph letters and the absence of any possible apathy and distinct signs of megalomania seem to contradict these diagnoses. Besides, a patient with dementia paralytica could hardly have lived for seventeen years; he would presumably have died from his cerebral disease after a few years.

To an ordinary physician without special psychiatric training the development of the mental peculiarities of Henry VIII seems to follow a certain line. Throughout his youth he was always successful, in his wars as well as in internal English affairs. At that time he was friendly and tractable, beloved by all and a great favourite with everybody. In his middle age, when he met with adversity, his character gradually deteriorated, or perhaps merely revealed its true colours, the unsuccessful pregnancies of Catharine, his consciousness of guilt over the unlawful marriage with his brother's widow, the resistance against his desire for divorce and for the marriage with Anne Boleyn, the successive matrimonial calamities and the resistance of his people against his usurped authority of the supremacy of the Church of England, combined with many other sorrows and troubles that beset him, aggravated the alteration of his character. The egoistic, brutal and reckless features of his character prevailed, and eventually he appears a psychopath of the boasting, swaggering, self-maintaining and self-glorifying type who, with transparent hypocrisy and meanness, calls upon everybody to inform him of other people's supposed heresy with the sole purpose of advancing his personal aims.

The difficulty of estimating the psychical and mental diseases of Henry VIII is due not only to the scantiness of the available evidence, but also to the very different outlook and attitude toward life that prevailed as compared with modern times. At that time the fact that high prelates and noblemen as well as common citizens could be tortured and executed without legal process and without evidence of their crime was accepted by the people with little or no protest. Everybody submitted to the supreme will of the King without attempting to complain so long as taxation was not involved. It is therefore very difficult for modern people to enter into the mentality of the time of Henry VIII and to comprehend the reactions—or absence of reaction—of his contemporaries against the tyranny and the cruelty of the sovereign.

DISCUSSION SUMMARIES

Chief physician *Paul Reiter*, M.D., specialist in psychiatry:

According to the maxim of Occam, "frustra fit per plura, quod fieri potest per pauciora", the numerous pathological manifestations in Henry VIII may in the most natural way be put under the common denominator of syphilis with tertiary manifestations throughout the last seventeen years of his life (the leg ulcer, the nose disease, the ptosis of the eyelid, the straddling legs, his coarse psychical deterioration, paroxysms of rage and other "attacks"), and I believe that he had a tabo-paralysis with protracted or stationary development. Although the classical picture of dementia paralytica includes euforia and megalomania and a rapid ending, it is well known that it may often develop slowly and intermittently with long stationary intervals. This form of dementia paralytica is especially characterized by the moral coarseness of the patient whose finer mental qualities generally degenerate and deteriorate, and who becomes the victim of the most frantic paroxysms of rage. Originally he must presumably have been a talented psychopath. The diagnosis of Flügel, published in the infancy of psycho-analysis, cannot be maintained, but probably the psychopathy must have constituted a disposition for the syphilitic mental disease. It is not necessary to consider Catharine of Aragon as the source of his infection, as other sources were abundant, and Catharine's "scandalous relationship" with Diego Fernandez is unproved.

Professor *Ejnar Jarløv*, M.D., specialist in internal diseases: The theory of the remarkable psychical déroute of Henry VIII being due to dementia paralytica seems so obvious that it is only natural that several medical writers have considered it to be a fact, in spite of some English authors' attempts to prove other diagnoses. On account of the very careful study of Dr. Brinch one may appreciate his doubts on this point—a doubt upon which I agree. That the King had syphilis I look upon as a fact according to the evidence available. As to the diagnosis dementia paralytica I have my doubts, because, for instance, of his ability to write sensible letters in his later years after having written unintelligible and incomprehensible letters some years before. I think that his mental condition might well be explained as a dementia alcoholica, especially because the clinical picture of the patient is characterised not so much by dementia as by the alteration of his character, which to a high degree resembles that of a habitual alcoholic, displaying wickedness, accusations against those around him, self-pity etc. Henry's consumption of alcohol—

like that of many of his contemporaries—was very great, and his occasional forgetfulness may very well be explained by intermittent abusus spirituosorum. His failing ability to walk may be due to alcoholic neuritis ("pseudotabes"), and the "attacks" may have been alcoholic eklampsia.

Chief physician *C. E. Jensen*, M.D., specialist in venerology: If we presume that Henry VIII suffered from syphilis there are a number of facts in his case history which fit very well into the picture: Catharine's miscarriages; Henry's headache; his skin disease after the return from France in 1513, which may very well have been a secondary syphilitic skin eruption; his straddling legs; and finally, his leg ulcer and the disease of his nose. These latter diseases may very well be considered as multiple simultaneous gummatous processes, of which that of the nose healed with cicatricial shrinking without any ulceration, whereas the leg gumma has ulcerated either because of unsufficient treatment or because of secondary infection with pyogenic cocci. The violent pain when the fistula was closed seems to indicate a secondary osteomyelitis, as the uncomplicated gumma is indolent. To diagnose syphilis with absolute certainty, however, is not possible on this foundation alone, especially because of the insufficient description of the skin disease in 1514; it may have been a furunculosis or an ecthyma. The idea of the leg ulcer and the nose disease being gummata is almost certain, and it must be considered as the most probable solution of the question.

Final remark by *Ove Brinch*: From the facts stated by other medical writers, as well as those put forward by myself and the opinion of the specialists expressed in the present discussion, it is possible to make the following diagnoses of the diseases of Henry VIII: 1) malaria, 2) adipositas, 3) abusus spirituosorum, 4) polyneuritis alcoholica, 5) syphilis III stadii (gummata multipla), 6) osteomyelitis secundaria, 7) dementia alcoholica and/or dementia paralytica, 8) psychopathia.

Obviously it is impossible to diagnose syphilis with absolute certainty on the symptoms and descriptions available. It would, however, be possible to prove or disprove the correctness of this diagnosis by means of an examination of the skeleton of the King. A scientific study of his bones would reveal the truth without any possible doubt. In the name of science I appeal to the British authorities, historians and pathologists that the sepulchre of Henry VIII be opened and the bones of the King be subjected to a scientific examination by the relevant specialists. May no prejudice prevent this effort to seek the truth.

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NOTES

1. Her health was poor, and after having married Philip II of Spain, she seems to have had a miscarriage. She had bad sight, which has been attributed to syphilitic keratitis or to common short-sightedness; both are pure guesses.
2. He died when seventeen years old, presumably from lung tuberculosis. A picture from his boyhood reveals him as a weakling with signs of adenoids and scrofula. He displays no signs of congenital syphilis.
3. Elizabeth died almost 70 years old; she presumably was a pseudo-hermaphrodite. She does not seem to have displayed any symptoms of congenital syphilis. Henry's paternity has been considered doubtful.
4. He died sixteen years old from a lung disease. Some months before death he suffered from an ulcerous skin disease which eventually made his hair, nails, fingers and toes fall off. It may have been congenital syphilis or lepra; the diagnosis is uncertain.
5. During Henry's war in France in 1544, his "nervous affection" is mentioned, but according to Chamberlin this must be due to the misunderstanding by a Spanish secretary of a French letter to the Queen of Hungary and the Emperor; besides, as to the term "nervous affection", it is doubtful what the exact meaning of it is according to modern medical terminology.
6. The present writer has not been able to discover where or by whom Henry has been accused of this.

A SECOND FOSSIL FROM SCHEUCHZER'S COLLECTION IN THE TEYLER MUSEUM

by

C. O. van Regteren Altena*

Some years ago Prof. B. Peyer of Zürich asked me if the famous fossil salamander from Oeningen, described by Scheuchzer under the name of "*Homo diluvii testis et theoskopos*", was the only specimen from Scheuchzer's collection in the Teyler Museum. I had to answer that no other specimens were catalogued as coming from that collection, but that the possibility of more specimens from Scheuchzer's museum being in our palaeontological collection could by no means be excluded, as the origin of so many of our fossils is unknown.

Since this answer was given it appeared that one of our fossil fishes (fig. 1) from the oligocene shales of Glarus bears the following inscription: "Incomparabili / RERUM NATURALIUM CIMELIO / *SCHEUCHZER*iano / XIPHIAM HUNC / In / Illibatae Amicitiae testem / consecrat / M. A. Cappeler MD. S. R. A. S." [Societatis Regiae Anglicanae Scientiarum][1]). This fossil is listed as no. 7421 "*Palaeorphynchum* [sic] sp. de Glarus" by Winkler in 1867. On comparing the specimen with the monograph of Wettstein (1866) it appeared to belong most probably to *Hemirhynchus colei* (Ag.). The specimen is about 80 cm long and gives a vague impression of the general form of the fish. The number of vertebrae is about 52, but the skeleton can not be studied in detail, the bones being covered by a thin layer of matrix.

Scheuchzer mentions this fossil on p. 1425 of volume 4 of his "Physica Sacra" in 1735. When dealing with the Glarus shales he writes: »Dessen Vaterland ist ein Berg, ja die Gähe eines sehr hohen Berges, wo kein See noch Fluss benachbart ist. Da sind Tafeln, welche von ungeheurem aufliegenden Gewichte gedrücket werden, worauf man aber mit grosster

* Teyler Museum, Haarlem, Netherlands.

Centaurus 1958: vol. 5: no. 3–4: pp. 370–72

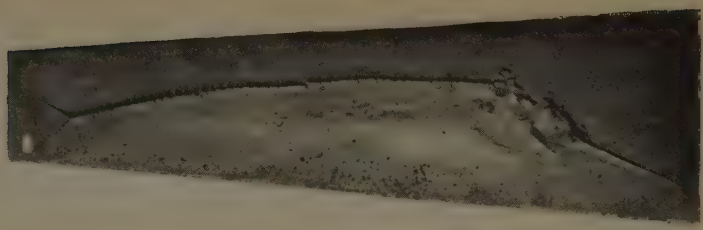

Figure 1.

Lust wohl ausgedrückte, nicht heimische, sondern Meer-Fische mit allen ihren Theilen schauen kan. Ich besitze unter andern einen ganzen Schwerdt-Fisch, *Xiphiam*, womit mein hochwerthester Freund, Herr D. Cappeler, meine Sammlung zu vermehren und zu zieren geruhen wollen. Es sind aber diese Fische ganz anderst als jene Veronensische, Oehning – und Pappenheimische, und jene welche Aehren, Schuppen, Fleisch, zeigen, welche nur etwan der Farbe nach verändert sind;...«

It seemed probable that the fish had been bought for the Teyler Museum by professor M. van Marum in 1802, when during his stay in Zürich he acquired the "*Homo diluvii testis*", "not without much trouble" (Van Marum, 1824). This supposition could be proven owing to help of Dr. R. Lorentz, librarian of Teyler's Foundation, who drew my attention to a series of diaries which Van Marum made of his journeys. These diaries are in the archives of the "Hollandsche Maatschappij der Wetenschappen" at Haarlem. Dr. J. A. Bierens de Haan, secretary of that society, kindly allowed me to study Van Marum's narrative of his trip to Germany, Switzerland, and France in 1802.

It appears that Van Marum visited the grandson of J. J. Scheuchzer in Zürich on June 24, 1802. A translation of the entry in his diary relating this visit runs as follows: "At the house of Dr. Scheuchzer I examined the skeleton which his grandfather J. J. Scheuchzer described and figured under the name of Homo diluvii testis in his Physica Sacra, and also the complete skeleton of a fish in the shale of the canton of Glaris. Both were bought by me for 14 Louis d'or. I could not get a view of the rest of the cabinet left by the said Scheuchzer." Thus we are sure now that these two fossils are the only ones acquired by Van Marum for the Teyler Museum from Scheuchzer's collection in 1802.

NOTES

[1]) Moritz Anton Cappeler (1685–1769), physician at Luzern, and author of several works on crystallography and physical geography.

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Reviews

R. Taton: *Causalités et accidents de la découverte scientifique.* Paris, Masson et Cie, 1955. 171 pages in-8°. 7 fig. 32 planches hors-texte. 1100 fr. frcs.

Ce petit livre fait partie d'une collection intitulée «l'Evolution des Sciences» composée de monographies de haute tenue sur des sujets d'actualité. Il est heureux que l'histoire et la philosophie de la science trouvent ainsi place dans un ensemble très large, qui embrasse le développement des sciences exactes et naturelles et de leurs applications techniques. D'autre part, ce n'est pas encore, malheureusement, dans ce cadre que peut paraître l'étude approfondie des conditions de la découverte scientifique qu'attendent les historiens de la science. L'auteur est d'ailleurs parfaitement conscient des limitations de son exposé; il se défend d'avoir tenté une synthèse, et il laisse d'ailleurs entendre qu'une telle tentative lui semble «dangereuse»; il se borne par conséquent à l'énumération purement descriptive d'une série d'exemples, en s'interdisant toute systématisation. Ce qu'il nous donne donc, ce sont des matériaux pour une étude synthétique; travail utile sans doute, mais qui ne représente aucunement la tâche principale de l'historien des sciences. J'insiste sur ce point, car il me semble que l'un des obstacles au progrès de l'histoire des sciences est précisément cette idée trop étroite de son but dont le présent livre offre un exemple. Il est trop facile de souligner les difficultés de la synthèse pour s'excuser de ne pas l'entreprendre. C'est la leçon du grand historien Henri Pirenne qu'il convient d'écouter: le véritable travail de l'historien, disait-il, procède par synthèses – provisoires sans doute, mais indispensables pour comprendre la signification des documents patiemment réunis dans l'analyse préliminaire.

Il est clair, cependant, que la composition d'un livre tel que celui que nous analysons implique, quoi qu'en veuille l'auteur, un élément de synthèse dans le choix et la classification des matériaux présentés. C'est par ce choix et cette présentation que le livre doit être jugé. L'auteur ne

nous apporte guère de surprise: nous retrouvons dans son exposé les cas les plus connus et en quelque sorte attendus dans une étude de ce genre. Son choix est d'ailleurs d'une grande étendue – il va des mathématiques à la biologie et la médecine – sans que la description de chaque cas se ressente des inégalités inévitables de la compétence de l'auteur dans ces domaines variés; l'auteur a fait un scrupuleux effort pour atteindre à l'exactitude et il y a fort bien réussi. Evidemment chaque spécialiste va trouver à redire sur quelque détail, mais je ne crois pas qu'il découvre aucune erreur sérieuse. La documentation est soignée, quoique l'on puisse souhaiter, à plusieurs reprises, une référence à la source première en plus de celle que donne l'auteur à la source secondaire où il a puisé; ceci s'applique surtout aux illustrations. Certaines de celles-ci ne paraissent d'ailleurs avoir qu'un intérêt anecdotique assez douteux; d'autre part, il convient de féliciter l'auteur des rapprochements heureux et très suggestifs, qu'il a eu l'idée de faire entre dessins anciens et photographies modernes des mêmes phénomènes.

Quant à la manière d'ordonner les divers exemples, l'auteur a adopté un plan solidement et habilement construit qui lui permet de passer successivement en revue les divers aspects du problème. Tout d'abord, les différents domaines de la découverte: mathématiques, sciences théoriques, sciences d'observation et d'expérimentation. Ensuite, les facteurs de la découverte: rôles de la méthode, de l'intuition, du hasard, de l'erreur même. Finalement quelques aspects annexes: le problème des précurseurs, la convergence des découvertes, les découvertes manquées, l'opposition aux idées nouvelles, la maturité des découvertes. C'est, comme on le voit, une revue assez complète de ce problème capital pour une histoire rationelle du développement de la pensée scientifique. Elle présente toutefois une bien regrettable lacune: l'auteur met trop exclusivement l'accent sur le côté individuel du processus de la découverte, et il néglige à peu près complètement le côté social; du moins traite-t-il beaucoup trop sommairement des relations sociales de la science et ne leur donne pas, dans son plan, la place qui leur revient. Bien entendu, sur chacun des points qui viennent d'être énumérés, l'auteur ne se risque qu'à de minces commentaires, qui laissent au lecteur une impression d'ensemble assez terne. Malgré cela, il mérite notre gratitude pour le travail préparatoire qu'il a accompli si consciencieusement et avec tant de compétence.

L. Rosenfeld

Maria Roosenboom: *Microscopium*. Leiden 1956. 59 pp. 115 fig. (Communication No. 95 from the Rijksmuseum voor de Geschiedenis der Natuurwetenschappen (National Museum for the History of Science), Leyden, Netherlands.)

This is a history of the development of the microscope from the first beginnings up to our time. The text is clear and easily understood, and it is profusely illustrated by 115 figures, ranging from black and white diagrams through coloured diagrams, reproductions of old illustrations, facsimiles of manuscripts and photographs of existing instruments to big colour-plates showing some of the finest pieces in the possession of the National Museum for the History of Science in Leyden.

The author has divided the subject by the parts of the microscope, treating first the optical part, next the illumination, the simple microscope, the microscope and medical science, arrangements for focusing, the movement of the object with respect to the lens, the stand and foot, and the binocular microscope, ending with some remarks on the phase-contrast microscope.

This arrangement is excellent if you wish to look up a certain point in the technical development of the microscope; on the other hand, if you are reading the book just for general information, the result will be that you are chased round the whole book again and again to find the illustrations, since one figure will illustrate details mentioned in many of the chapters. For the general reader a simple chronological arrangement with full description of each instrument in turn would be preferable.

The "Historical Synopsis" p. 10–11, where the development of the microscope and the discoveries made by its help are placed in relation to the economic, political and cultural conditions of the times is very interesting, as is the table, p. 56–57, of "Discoveries with the aid of the optical microscope of importance for medical science".

On p. 58 there is a short list of books relating to the history of the microscope, 17 entries beginning with R. Hooke's Micrographia of 1665, and ending with two works published by the National Museum in 1953 and 1954. Nowhere in the text are there any references that might enable you to find the evidence for the statements; anybody quoting anything from this book will do so at his own peril. But since there is no index and not even a table of contents, it will probably be read for pleasure only; and indeed it has been a great pleasure to read it.

A. G. Drachmann

Rudolf Nissen: *Erlebtes aus der Thorax-Chirurgie*. Stuttgart, Georg Thieme, 1955. 66 pp. Ill.

Dem Verfasser dieses Büchleins gelang es im Juli 1931, die erste erfolgreiche Pneumonektomie durchzuführen. Er hat die ganze Entwicklung der modernen Thorax-Chirurgie mitgemacht und beeinflusst, und man liest mit besonderem Interesse, was er über die Geschichte dieser damals so dreisten Eingriffe zu sagen hat. Die Schrift ist eine deutsche Ausgabe von »The Romance of Thoracic Surgery«, einem Vortrag, den der Verfasser als die Mitchell Banks Memorial Lecture an der Universität Liverpool im November 1953 hielt. Sie gibt einen geschichtlichen Überblick über die ganze Frage: Lungenchirurgie, Herzchirurgie, die Chirurgie des Oesophagus und die operative Behandlung der Lungentuberkulose. Wir hören vom Abtragen des vorgefallenen brandigen Lungenteils bei Brustverletzungen im Mittelalter, von der Empyembehandlung, von Sauerbruchs Unterdruckkammer, von der ersten Herzwunde, die Rehn im Jahre 1896 mit glücklichem Erfolg suturierte, bis zu den heutigen Eingriffen im Inneren des Herzens. Nicht weniger als 43 Seiten sind Bildern gewidmet, sowohl Abbildungen grosser Thorax-Chirurgen als Faksimilen ihrer epochemachenden Schriften. Nicht ohne Grund hat der Verfasser seinem Liverpool-Vortrag den Titel »The Romance of Thoracic Surgery« gegeben. Die Entwickelung der modernen Thoraxchirurgie ist ein Roman, ein Märchen, und vom Verfasser gut erzählt.

Ed. Gotfredsen